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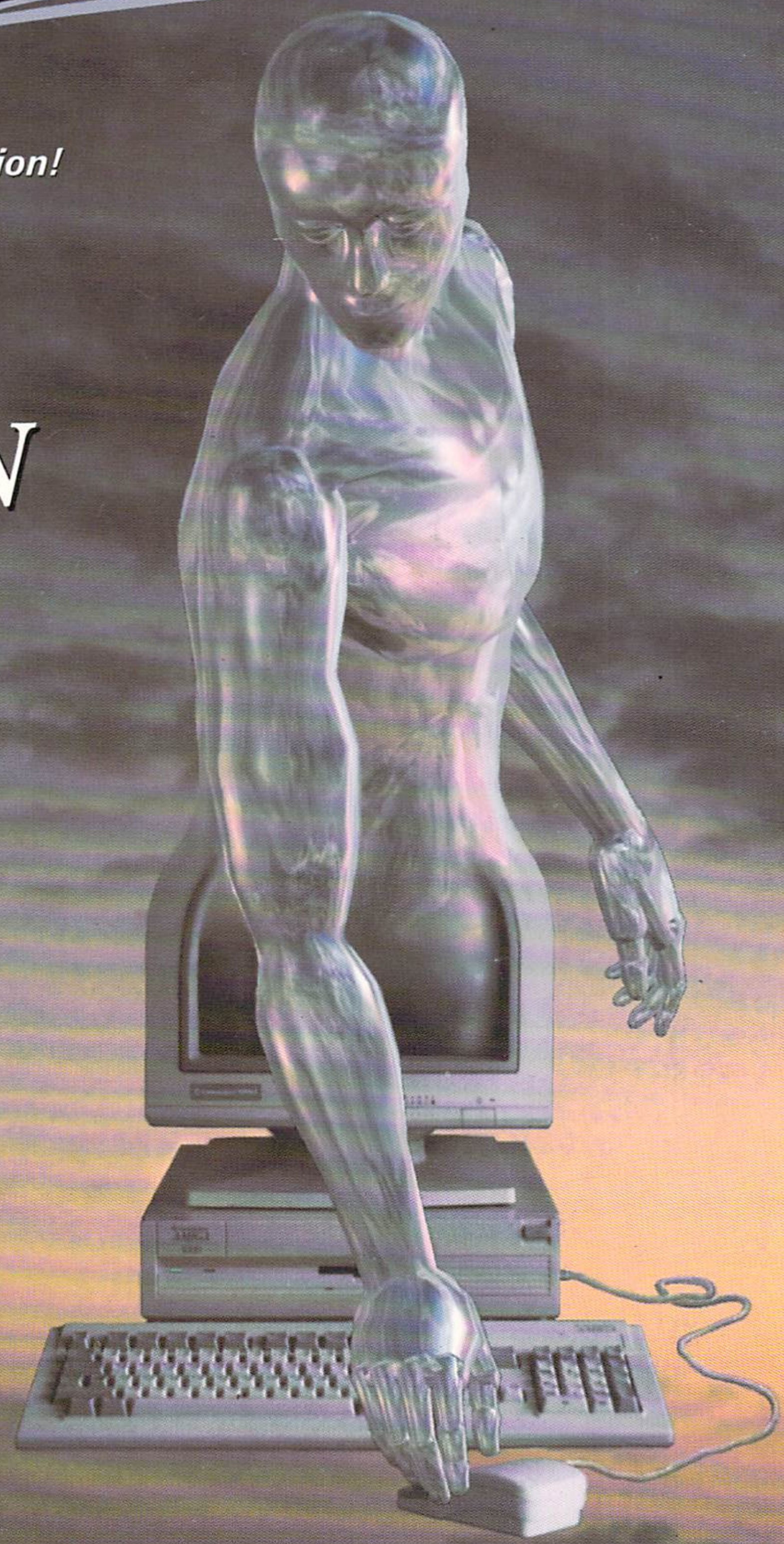
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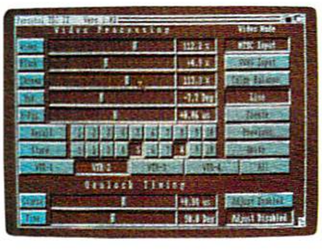
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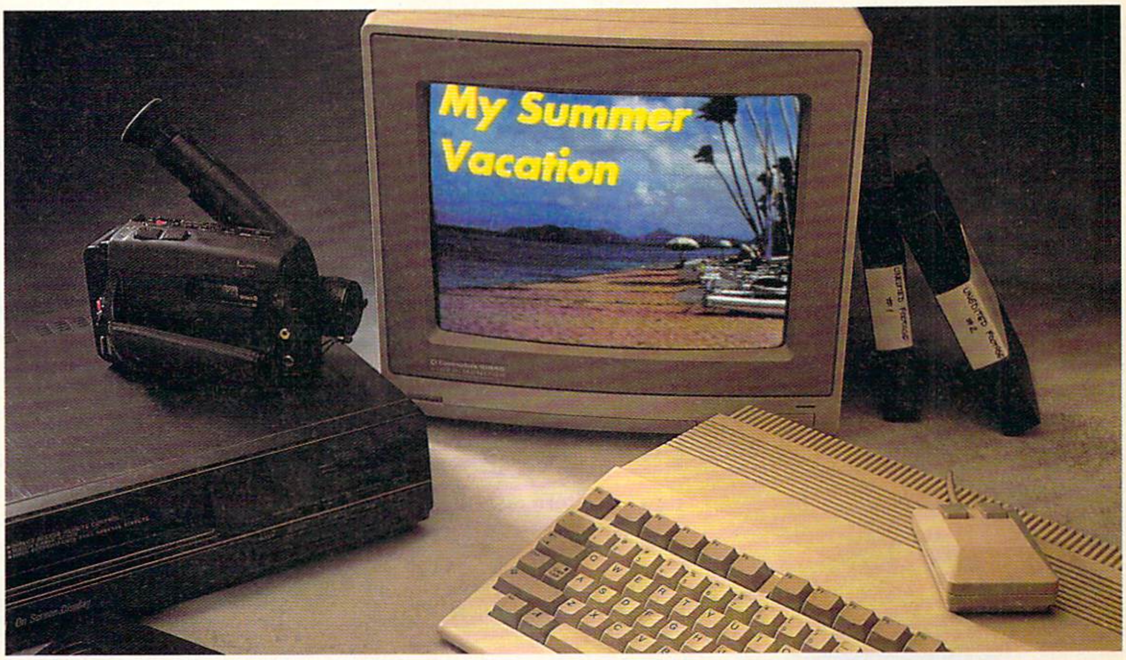
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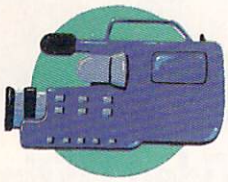
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Looking Back To the Future

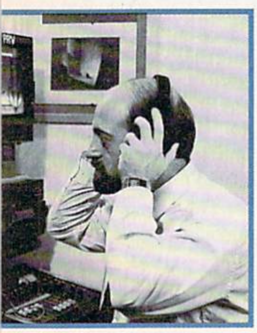
Amiga Video and Animation has come a long way in the last two years... and you may need a crystal ball to see how far it will go over the next two!

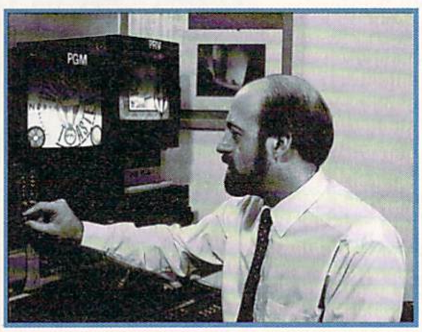
By Lou Wallace

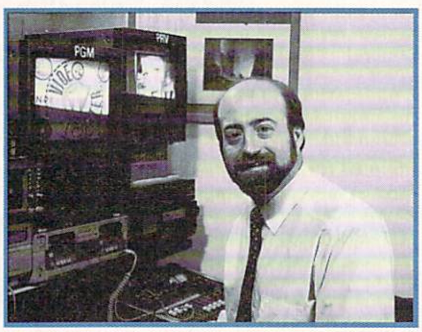
Two years ago, we ended our *1990 Video and Animation Special Issue* with an editorial entitled "You Ain't Seen Nothin' Yet," in which I took a look at where the Amiga was—and, more importantly—where it was likely to go in the future in the areas of animation and video. Before writing this introduction for the sequel to that issue, I went back and reread the piece.

With the clarity of vision that hindsight often allows, I could see just how primitive things were then, and how far we have come in only two years. At that time, we had first-generation multimedia products like VIVA, The Director, and UltraCard, and were just looking forward to a second generation of products, such as DeluxeVideo and an unnamed authoring program from Commodore.

Today, we are using third-generation multimedia-authoring tools like CanDo v1.5, The Director, version 2, Foundation, and AmigaVision v1.7, all of which offer features we at that time didn't even know were possible.







And what a difference two years have made in the area of graphics hardware! At that time, those users (notably 3-D animators) who wanted 24-bit displays were limited to either the Mimetics or the Impulse framebuffers. Software support for these devices was limited to 3-D programs such as Sculpt-Animate 4D and Turbo Silver. Traditional 2-D artists who wanted to paint using high-resolution, sixteen-million-color displays were forced to look at other computer platforms.

After the "Hard" Years

But that was yesterday. Today's end users not only have more hardware options, but they also have a wide range of advanced graphics solutions to choose from, spanning a broad spectrum of prices as well as applications.

You want graphics hardware? We've got hardware! We have HAM-E, DCTV, ColorBurst, Firecracker 24, IV24, the Video Toaster, A2410, Harlequin, Rambrandt, DMI Resolver, and more.

You want 24-bit paint programs? Take a look at DCTV Paint. This computer paint program offers the artist software that is so close to paint you can almost smell the thinner. Need a good real-time 24-bit-image editing program? The Firecracker's Light24 is a joy to use. Want to composite images? ToasterPaint is just what the doctor ordered. Need a megapixel high-resolution color display for CAD or illustrations? Try the Resolver from Digital Micronics.

Need real-time animation with more colors or resolution? Either HAM-E or DCTV will do the trick. You want to process, alter, or convert images? You need ASDG's AD Pro, which supports a variety of graphics hardware. Want a real-time 24-bit framegrabber? Try either the Video Toaster or GVP's IV24.

Did I mention animation? Today, we have DeluxePaint IV, SpectraColor, and the Disney Animation Studio for 2-D animators. DeluxePaint and SpectraColor support HAM animation, DPaint and Disney offer onion-skin drawing capabilities, and DPaint now has 2-D morphing.

Today's 3-D animators have a serious problem—deciding which powerful package to choose: Impulse has just released Imagine v2.0, while the Toaster's LightWave 3D is in its second incarnation. Real 3D has crossed the Atlantic and is winning a lot of friends, Caligari Broadcast has been greatly enhanced, and JourneyMan and Draw 4D Pro offer unique three-dimensional modeling and animation features. Also, let's not forget 3-D landscape software such as VistaPro, Genesis, and Scenery Animator.

The Video Explosion

Did someone say video? In our last Special Issue, the only major video hardware we had to discuss was an impressive fam- ►

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ily of genlocks. Well, today, we still have a lot of genlocks—ranging in price from under $200 for entry level to several thousand dollars for high-end, broadcast-quality equipment.

Some of these genlocks have now added special features that set them apart from the traditional idea of what you can do with an overlay card. There's the Video Blender, which is an extremely high-quality genlock with a variety of video effects. And let's not forget GVP's IV24, a multifunction video card that offers—as one of its many features—the ability to perform both composite and RGB genlocking.

But genlocks are just the tip of the video-hardware iceberg. Over the last two years, Amiga videographers have learned a new term: time-based correction. Until recently, time-base correctors (TBCs) were expensive video gear, but because of the demand created by the Video Toaster, Amiga owners can now purchase one- and two-channel TBC cards that plug directly into an Amiga slot. These new models, from such companies as Digital Processing Systems (DPS) and Digital Creations, support SVHS as well as composite input, and they offer proc-amp controls. Most importantly, the price is less than $1000 per channel—a significant saving over traditional TBCs that cost several thousand dollars per channel.

Also new from DPS is the Personal V-Scope. This plug-in card gives videographers both a waveform monitor and vectorscope for under $1000. Designed to work with the Personal TBC II card, the V-Scope's supplied software also supports ARexx control of both cards.

Amiga animators now have several dedicated hardware animation controllers to choose from. These new single-frame controllers (SFCs), while far less expensive than traditional devices, actually offer more flexibility and options then last year's high-priced video-industry models.

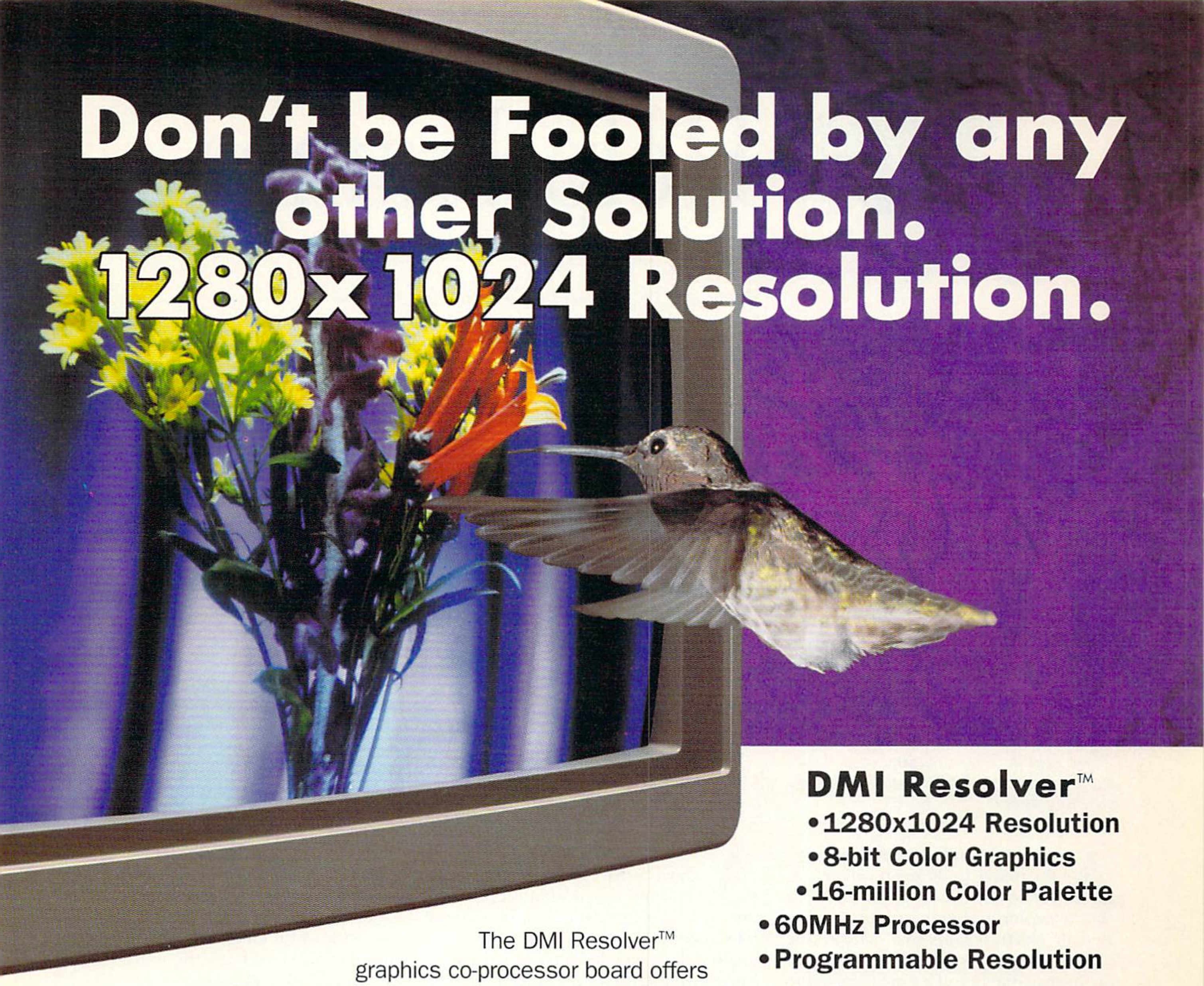
Of course, in order to actually do any desktop video, you need some sort of video-editing system. Here, too, there are new solutions to choose from. From Future Video's EditLink 2000 to RGB Computer's AmiLink, you can pick and choose the editing system that best suits your price range and video gear. The latest version of AmiLink now even offers support for both the Video Toaster and low-end industrial-video decks like the Panasonic AG1960.

Then we have the Video Toaster. This baby was just a long-awaited dream in our last Special Issue, but since then it has exploded on both the Amiga and the larger video scenes. Generating more publicity than anything that has ever appeared on the Amiga platform, the Toaster has been featured everywhere from *Time* to *Rolling Stone*.

The Toaster has an incredible new arsenal of effects—including animated wipes, organic transitions such as smoke and pouring water, and special three-dimensional effects like wrapping video on the surface of spheres and cubes—as well as the ability to position some of the compression effects in order to properly do over-the-shoulder shots.

And that's just the beginning. The Toaster's LightWave 3D software sports well over a hundred new features, with some of my favorites being the ability to perform multiple-object morphing, better antialiasing, higher resolutions, the ability to load and save surfaces, *real* ray tracing and refraction, a vastly improved modeler, and—well, you get the picture.

I believe I was right two years ago to have said, "You ain't seen nothin' yet." And if we could gaze another two years into the future, I think we could safely say, "And there's no telling where it's gonna end!" ■

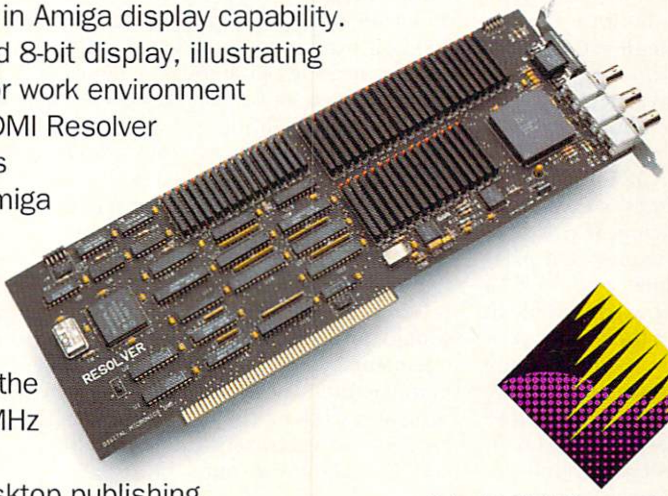


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Help Frames

Answers to Frequently Asked Questions

About Video and Animation

By Steven Blaize

When many of us finish a particularly satisfying animation, the next logical step is to put it on videotape. While the Amiga does simplify the process, there is much to consider when placing computer art on videotape. To help you avoid common mistakes and get started on the right foot, I have compiled a list of animation/video questions I am most often asked.

Q *Whenever I draw boxes or use fonts with thin lines, my display flickers both in hi-res mode and when I output it to videotape. How can I eliminate this annoying flicker?*

A Once you understand what causes the image to flicker, it will be easier to fix. The picture on both your television and Amiga monitor is created by electron guns that activate the screen's phosphors. The guns illuminate the picture one line at a time from left to right and from top to bottom. On the first pass, only every other line is updated (such as odd-numbered lines 1, 3, 5, etc.). Then, the process begins again at the top, only this time every even-numbered line is updated.

The entire screen (525 lines with NTSC) is updated 30 times per second—a process called interlacing. If you draw a horizontal line that is only one pixel thick, it will literally blink on and off 15 times a second. The line will be visible in the first pass, but not in the second. You can reduce the flicker by making the line a little thicker. If you must have a very thin line, try placing a one-pixel line above and below that has a color between your line color and your background color. For example, if you have a white line on black, use gray above and below. This should reduce your flicker.

Q *I have several videotapes to edit together and was told that if I want smooth transitions, I must use a time-base corrector. What is time-base correction and how can I do it?*

A Part of the video signal discussed above is the sync signal. Basically, the sync signal identifies timing for both the horizontal and vertical movement of the electron guns. In order to produce a steady video signal and a complete video field, the guns must start at the top and finish at the bottom. When you edit two (or more) video signals together, the sync signal must be identical for each video source, or you will end up with a vertically flipping image because the guns are receiving two (or more) sets of instructions. To prevent this from occurring, use a time-base corrector (TBC) to lock video signals together.

Generally, TBCs lock to an external reference signal, so that each component refers to the same sync signal, which should make for smooth transitions from one source to another. Because several manufacturers now offer TBCs for the Amiga, you have a choice of a number of inexpensive units. (For more on TBCs, see "Operation Cleanup," p. 31.)

Q *I have heard that the Amiga can produce some of the impressive 3-D animations shown on television. How can I produce high-quality animations like those?*

A First, you will need to select a 3-D program that renders in 24-bit (16.7 million colors) and one that permits animation control. There are many excellent choices on the Amiga (see the chart of 3-D graphics programs on p. 110). The Amiga and even most high-end computers do not have the speed to play 24-bit animations directly from the computer. Instead, professionals record almost all broadcast animations to videotape one frame at a time—a process called single-frame animation.

One by one, you load the frames of the animation into a video-display card. You then use a single-frame controller to control the video recorder and record single frames onto the tape. Repeat the process for your entire animation. When you play back the tape, the movements will be smooth and precise.

Currently, the equipment required for single-frame recording is somewhat expensive. You need a video card (generally referred to as a framebuffer) to display the 24-bit image; a genlock to convert the display into a video signal; a single-frame controller; and a professional-level tape deck that is accurate to a single frame. Some new single-frame controllers are available (from Diaquest, Nucleus, and BCD), and boards such as the Video Toaster (NewTek) contain both a framebuffer and a genlock. (See "Precision Control" on p. 38 for more on single-frame recording.)

Q *I create animations with different paint programs and also do some 3-D work. I like to use bright colors, and my animations look fine on my Amiga monitor. However, when I transfer them to videotape, some colors smear together. Why?* ►

A You are running into a basic problem regarding the NTSC video signal used when transferring to videotape. When your animations appear on an Amiga monitor, you are viewing a digital RGB display. The color of every dot on your screen is distinct from the next (within the restrictions of Amiga video modes). In order to convert the RGB signal to an NTSC signal appropriate for transferring to tape, you must use an encoder or genlock. The picture is then an analog waveform signal.

The quality of the resulting signal depends a lot on the quality of the encoder or genlock you use. Still, even the best encoder or genlock produces color bleeding or color crawl (a shimmering border effect) when colors are over-saturated. Deep blues and reds suffer the most, however, and bright whites against very dark colors also show this effect.

The general rule is not to peak any of the colors in your animations. If you are using DPaint (Electronic Arts) or other packages that select RGB values from 0 to 15, try to stay between 1 and 13. If you are using a 24-bit package that gives you selections between 0 and 255, try using values between 20 and 208.

When working with 3-D renderings, this is hard to control, because lights and other objects affect the final rendered image. I generally render my images and then test the picture on an NTSC monitor. If the colors are too intense, I often process my images in Art Department Professional (ASDG), using the Dynamic Range operator to reduce the overall range of colors.

Q *I recently purchased a music library for producing short video animations. The music cuts are 30 seconds long. I created an animation in DPaint that is exactly 900 frames (30 seconds×30 frames per second). I have tried several animation players that indicate a 30-frames-per-second rate, but the animation takes 38 seconds. Can you help?*

A You are trying to play back your animation in real time. The Amiga is quite good at this, but there are built-in factors that slow down the process. Generally, you load animations into, and play them back from, RAM. Thus, you must have enough RAM to hold the entire animation plus the player program. The Amiga's ANIM format compression scheme stores only the changes between the frames of animations. If your animations change a lot from frame to frame, it takes longer to decompress and update the screen—and even longer if you are using high-resolution and overscan mode. Even on accelerated machines, you may not be able to achieve exactly 30 frames per second.

Some players allow you to load your ANIM into RAM decompressed. While this increases your playback rate, it significantly reduces the number of frames you can load into RAM. The solution is a design decision. The Director 2 (Right Answers Group) has a nice feature that lets you set the exact time of the animation so that your final frame ends precisely at that time.

There are still hardware limitations to contend with here, but you can remove a number of frames if necessary, and the player program will make sure the animation ends in exactly 30 seconds. You can also break the animation into smaller pieces, play them back decompressed at 30 frames per second, and then edit the video together. This, of course, requires video-editing equipment. ►

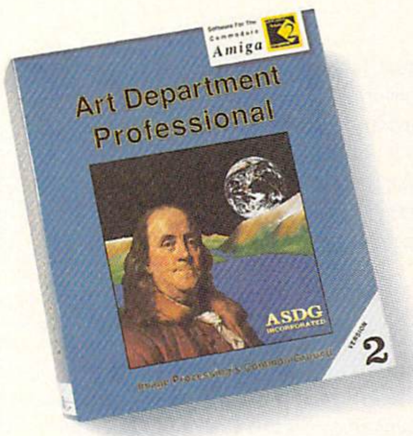
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Q *I have seen DCTV (Digital Creations) and HAM-E (Black Belt Systems). Both claim to use 24-bit pictures and play animations in real time. What are 24-bit pictures and how do these products play animations?*

A Both of these products are hybrid display devices that let the Amiga display more colors than is possible with native Amiga video modes. The term 24-bit refers to the number of bits defining a specific pixel's color. Eight bits each of Red, Green, and Blue total 24. It really is not important to understand what bits are or how many. What is important is that 24-bit pictures permit the 16.7 million colors necessary for photo-realistic images. Both DCTV and HAM-E load 24-bit pictures and convert them to their respective proprietary formats. While the images you see are not true 24-bit, the quality is excellent.

While many argue that one device is superior to the other, it is my experience that it depends on the picture. Because DCTV outputs only an NTSC signal, highly saturated colors will tend not to convert well. On the other hand, HAM-E outputs an RGB signal with fewer colors (it supports several formats), but it is digitally accurate.

If you are transferring HAM-E to videotape, you will need an encoder, and image quality will vary depending on the device. The benefit in using HAM-E is that the Amiga interprets its image format as standard Amiga high-resolution files. In this manner, DCTV or HAM-E frames can be put together in an ANIM format and played back in real time. Due to the nature of hi-res files, however, you may not get 30 frames per second (real-time) playback (see previous question).

DCTV has an advantage here, as you can convert the files to what the Amiga thinks is an eight-color, high-resolution image with little image loss. These ANIMs play in relatively close to real time. (For more on 24-bit display devices, see "Brave New Worlds of Color," p. 78)

Q *I have seen some videotapes that I would like to digitize for use as backgrounds and wraps in my 3-D program. Can you tell me how to do this?*

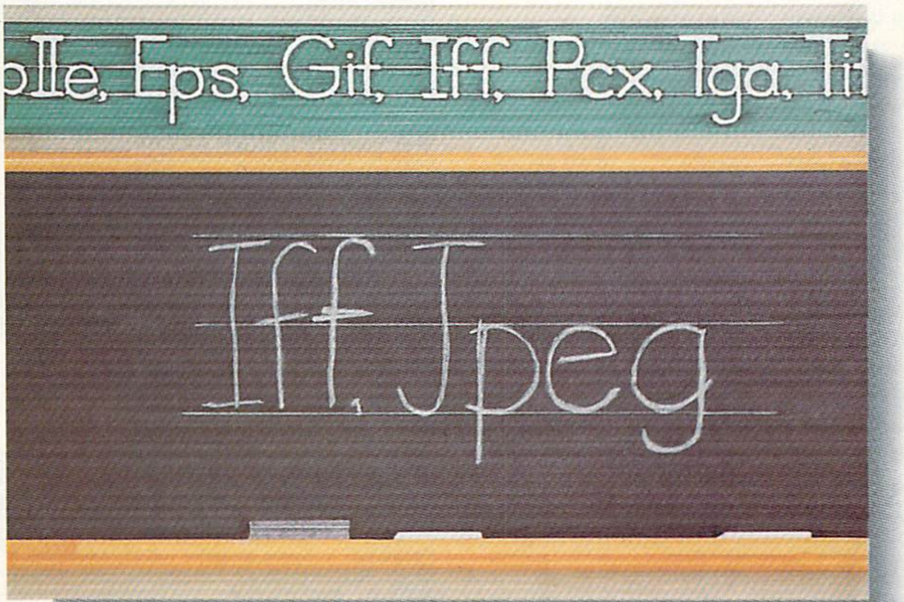
A Before I explain how, let me provide a word of warning. Be careful! If these tapes are copyrighted, as they probably are, you could be laying yourself open to suit for copyright infringement. The same holds true if you want to digitize pictures from a book or magazine.

This aside, make sure that the quality of videotape is the best you can obtain. Be wary of rental videos, for example, because unless the tape is new, it is likely to be scratched from being played so often. There are two basic methods of digitizing images from video sources.

One is to use a real-time framegrabber, which will grab a frame (or field, depending on the device) of moving video. The second method is still-frame digitizing, which requires a still image of six to fifteen seconds' duration, depending on the device. If you have a picture that can be placed on a copy stand, the still-frame digitizer is an economical alternative.

Digi-View Gold (NewTek) and DCTV (Digital Creations) are two popular still-frame digitizers. If you must capture video frames, the still-frame digitizers may present a problem. Even if your VCR has a freeze-frame that looks steady, it may not be providing a clean video signal to the digitizer. If this is the case, you will need to obtain a real-time framegrabber. There are 24-bit framegrabbers in both the Video Toaster (NewTek) and the new Impact Vision 24 (GVP). ■

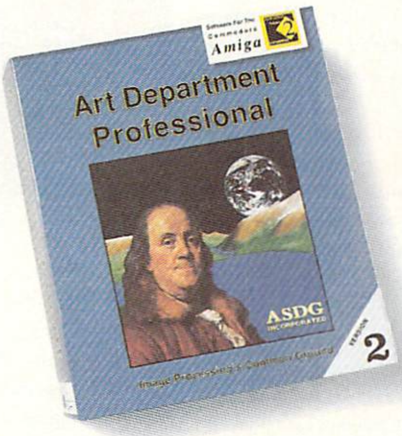
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AMIGA PROFILE

PLAYING FOR REAL

THIS PAST NOVEMBER, I received an invitation to attend a special screening of a new show being produced by the Nickelodeon cable television network. Set to begin airing in January 1992, *Nick Arcade* uses Amiga computers in numerous aspects of pre- and post-production. Because of the concepts and technologies being employed, *Nick Arcade* promises to be one of the more innovative shows on TV.

Using advanced virtual-reality techniques, *Nick Arcade* places contestants in a series of computer-based arcade games where they must interact with different creatures and objects. To design such an environment required state-of-the-art computers, and after a search for the best machine for the job, it became obvious to the show's creators that the Amiga was the only one capable of performing the work in a cost-effective manner.

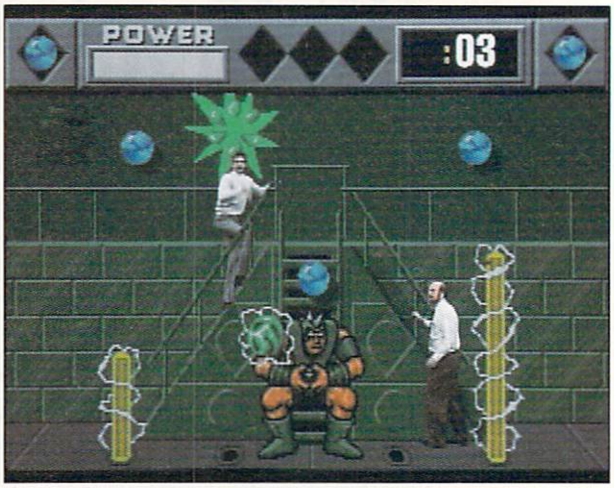
In *Nick Arcade*, two teams of two players each are pitted against one another. As a team wins a round, it gains control of a fully animated figure known as Mikey. Mikey is created on the Amiga and then moved by the controlling team through an adventure-like game that offers more challenges and a chance for prizes. At the end of the game, the winning team participates in the Bonus Round, which is one of the more spectacular aspects of Nick Arcade.

The Bonus Round actually places the players inside an interactive arcade game. In these segments, the players must be careful to avoid the weapons and objects being hurled at them by their computerized opponents—any contact drains valuable energy. At the same time, they must interact with other arcade elements to gain points and complete the session.

The virtual-reality techniques used in *Nick Arcade* are accomplished via Amigas equipped with The Vivid Group's Mandala software, A-Squared Distributions' LIVE! graphics card, and some sophisticated Ultimatte technology. The virtual-reality segments are quite impressive, which is not a surprise because they were programmed by Amiga veteran *Dean Friedman*. According to the show's producers, *James Bathen* and *Karim Miteff*, the Amiga was not just the least expensive method. It was, in some cases, the only way certain things could be done in the time allowed for the show's development.

Nine Amiga 2500s and 3000s are put to work on *Nick Arcade*. The machines handle a wide variety of tasks, including real-time graphics and sound during actual gameplay. In addition, two MIDI-equipped CDTV systems are in place to act as scorekeepers during play.

As I looked around the show's set, I found even more Amiga hardware and software in use. For example, besides the custom code created expressly for *Nick Arcade*, Right Answers Group's The Director (used for a number of software applications), Digital Creations' SuperGen (for genlocking video and animation), and GVP's IV24 graphics card (for digitizing and painting 24-bit images) were all being employed. In fact, with the IV24, the show's programmers can now share graphics between an Amiga and the studio's Quantel Paint Box, something they had not been able to do before.

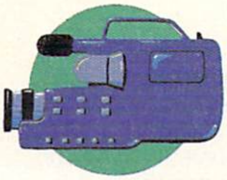


Amiga-based virtual-reality technology puts you directly into Nickelodeon's new TV arcade-game series, *Nick Arcade*.


Some of your formidable computerized opponents in Nick Arcade.

After spending a day in the studio watching kids ranging in age from ten to fifty try out the virtual-reality segments, I was impressed by the enthusiasm with which the game was received. (Yes, I tried it, too—see the accompanying illustration—and loved it!) With the current popularity of video games, I think this show will probably do well. If you have access to the Nickelodeon network and want to see a lot of Amigas performing state-of-the-art work (and play), tune in to *Nick Arcade* and check it out.

—Lou Wallace



Basic Videographics

A Troubleshooter's Guide

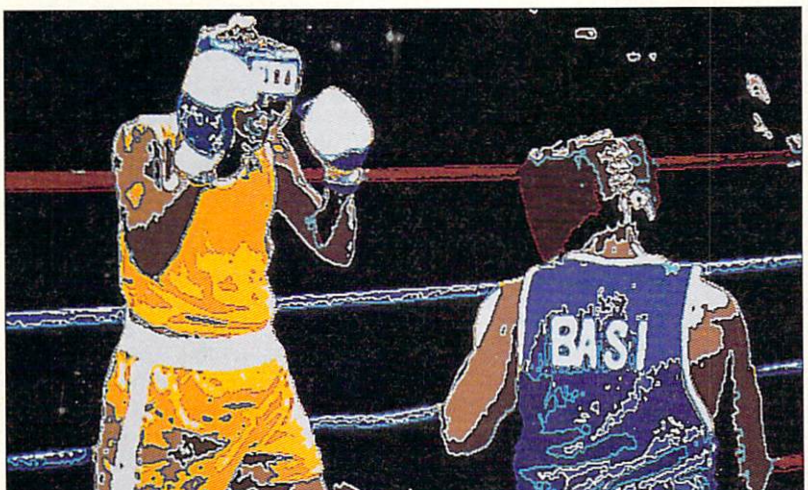
Put on your trunks and lace up your gloves as we go head to head with the causes--and solutions--of the videographics problems most likely to "TKO" your video efforts.

By Fred Hurteau

Anyone who has worked with desktop video knows that it is a fickle medium. It can be a maddening experience when something unexplainable happens to your video image, leaving you with no idea as to the cause or how to avoid the problem in the future. When producing computer graphics for video, the last thing you need is to compound problems for yourself, especially in the areas of color and screen resolution. You can avoid problems, however, by simply understanding what can cause them and by following a few basic guidelines.

The Importance of Resolution...

National Television Standards Committee (NTSC) composite video (the video-format standard used in the United States) is interlaced. Therefore, to ensure video compatibility, your Amiga graphics should always be created in an interlaced resolution—that is, 400 lines or more vertically (screen formats of 320×400 pixels and 640×400 pixels). Ghostly squiggles in the middle of the screen on your taped graphics is one effect of not using interlaced resolutions. You may also encounter equipment that will not lock properly to noninterlaced signals, therefore causing your image to jump up and down when played back.



Interlacing, however, can cause an annoying flicker that must be dealt with. The only way to stop this flicker is to avoid the use of one-pixel-high horizontal lines, especially if such lines and their surrounding areas are of contrasting colors. You should also try not to use single pixels of contrasting colors.

These technical problems can be overcome simply by using interlaced graphics as recommended. If this is not possible, utility programs such as SetLace (available on Fred Fish disk #9 and Amicus Disk #1) force the Amiga display into interlaced mode, even with noninterlaced screen formats. While this allows the transfer of noninterlaced graphics to video, it does not alleviate other resolution problems—those that can only be addressed through extra computer memory.

...and RAM

The Amiga has a special memory area, called chip RAM, where graphics data must be resident ►

while displayed on the monitor. Any other type of memory in your Amiga is called fast RAM. Fast RAM cannot be used as chip RAM, but it can still make a big performance difference in any graphics application.

Resolution (pixel count) and the number of palette colors are the two major factors that affect the memory

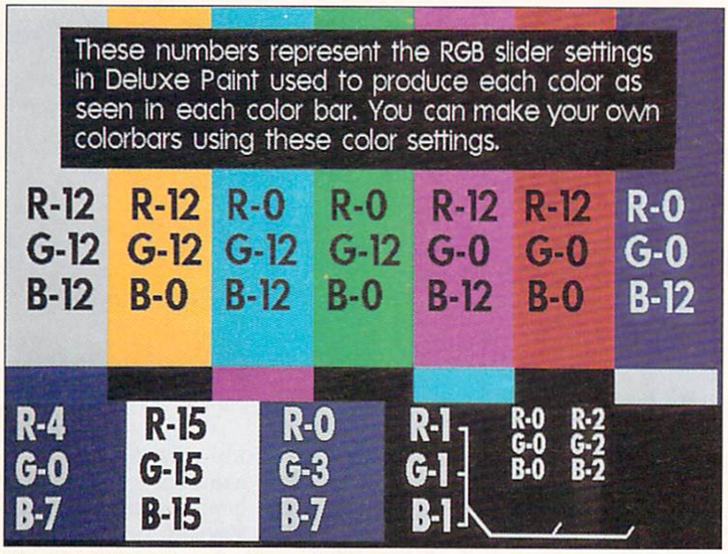


Figure 1. With this selection of DeluxePaint's color settings, you can create your own colorbars.

space required by a graphic. For example, a 320×200-pixel graphic has a total of 64,000 pixels, while a 640×400 pixel graphic has four times more—256,000 pixels. More colors in a palette mean more bitplanes are required to define these colors. One bitplane allows two colors, two bitplanes allow four colors, and so on up to six bitplanes.

Amiga computers originally had only 512K of chip RAM. Without additional fast RAM, your graphics program must occupy this 512K chip-RAM area, which leaves less space for image data and thus limits the available screen resolution. With the advent of 1MB chip RAM and the Amiga 3000's 2MB chip RAM, there is now less of a chance that a user will run out of chip-RAM space. You can still come up against a wall, however, if you have no additional fast RAM. If the resolution and number of colors you choose require more space than that left in chip RAM, you will be unable to achieve that resolution. You simply cannot fit a gallon into a quart jar.

Additional fast RAM can hold much of your graphics program and so provide you with more free space in chip RAM. With enough fast RAM and chip RAM, all resolutions and all color-palette options are available. Memory demands do not stop here, however.

Overscan

There is another resolution problem to consider when working with video graphics—overscan. In overscan, your graphic image is displayed right to the edge of your monitor, or slightly beyond, eliminating the blank border around the edge of the screen. Your television image does not stop a half inch away from the edge of the screen; the same should be true of your video graphics. And with sufficient chip and fast RAM, you can access overscan screen modes in interlaced resolutions and make your graphics look more professional.

Standard overscan screen modes in interlaced resolutions are 352×480 and 704×480 pixels. With enough chip RAM, however, the larger 368×482 and 736×482 resolutions provide a more suitable overscan for serious work—strongly recommended if your video graphics are for the broadcast medium. Fortunately, much of the professional-level graphics and video software—such as Broadcast Titler II (InnoVision Technologies), Pro Video Post (Shereff Systems), Toaster Paint (NewTek), and Electronic Arts' DeluxePaint IV—accepts graphics in 736×482 resolution, so this larger overscan format is easier to access and is gaining in popularity for video work.

Once again, this is all made possible only by having extra RAM. Today's high-quality graphics programs are larger and use more memory space for program code. To justify this increased size, the programs offer more time-saving features, such as the ability to pick up large brushes and apply stencils, as well as new creative functions—spare brushes, animation frames, page transitions, texture mapping, and large-font loading, to name a few—that all require additional RAM space. More RAM also makes system crashes less likely, because crashes are usually due to memory conflicts.

You simply cannot have too much RAM when it comes to graphics applications. No other expenditure offers more benefits and eliminates more problems. (Luckily, RAM expansion is more affordable today than ever before.) You are sure to find that extra RAM will pay many dividends and make life with the Amiga more fun.

Hot Is Not Always Cool

You may have heard the term "legal colors" associated with video. In broadcast television, colors that are too "hot" are actually oversaturated: The chroma is too rich, or the luminance (brightness) is too high. This can cause the television signal to exceed proper bandwidth specifications, meaning the TV station may transmit spurious signals that cause interference—not "legal" by Federal Communications Commission standards. Most TV stations, however, have processing equipment that automatically limits excessive chroma or luminance.

Desktop-video enthusiasts are not usually concerned with the legal broadcast aspects of oversaturated colors, nor can they afford the expensive test equipment broadcast engineers use to ensure that their videos contain legal colors. What should be of concern to desktop videographers are the problems—inherent in composite video—of chroma crawl and color bleed, which are both aggravated by oversaturated colors.

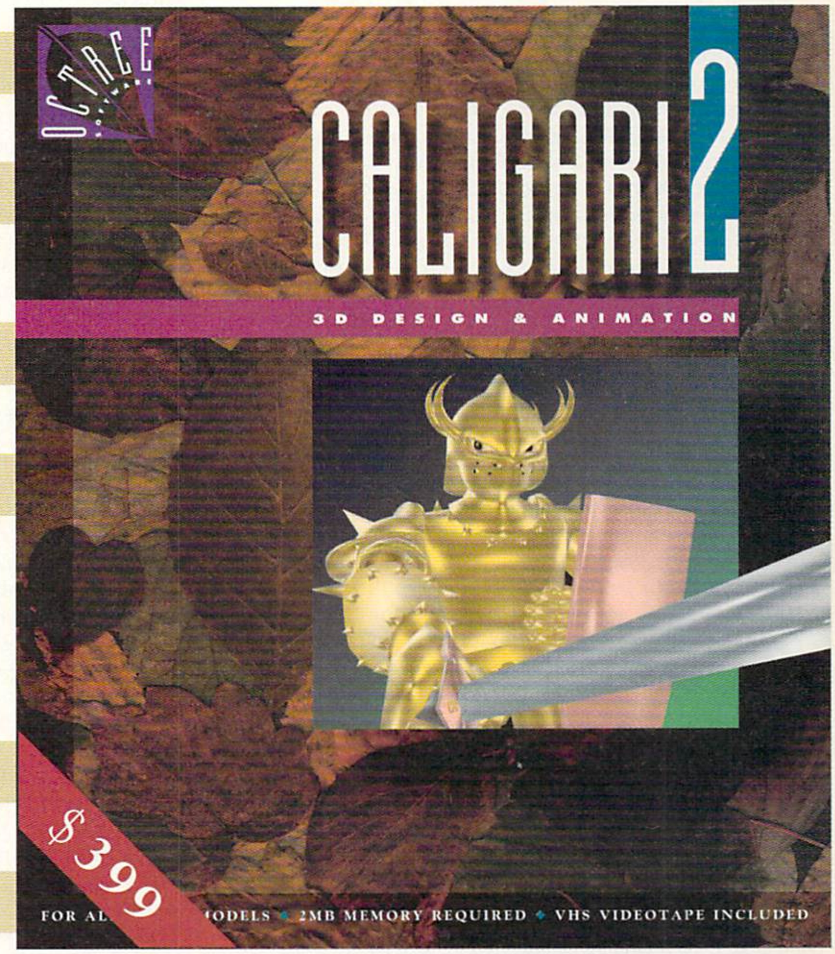
When the chroma, or color, control is turned all the way up on your composite monitor, everything on screen appears to have Day-Glo colors, and you cannot properly judge saturation or luminance. To do so, you must first set the monitor controls correctly. Because skin tones are the best visual guide to setting your controls, begin by playing a tape that clearly shows people's faces on your monitor, or use your VCR as a TV tuner. Tune in a news broadcast in which you often see the anchor person on screen, on and feed the video signal to the monitor you want to adjust.

Next, set the chroma control so that the color is gone, and all you have are grays. Now begin turning ►

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up the chroma control until you start to see a bit of color tint in the flesh tones—this is where personal judgement comes into play. The color should be soft and natural; do not turn up the color too much. Also, set the tint control so that the skin is not too yellow, too red, too green, or too purple.

For the next step, you will need colorbars. Several Amiga hardware and software packages come with a disk that includes a colorbar graphic. Or, if you can access on-line bulletin boards, you will find a shareware program called BarsNTone (contact Mike Berro, BCS Software, 13432 Lochrin Lane, Sylmar, CA 91342, 818-362-6031; $15 registration fee), which shows colorbars and produces a 1000-Hz audio tone. You can also make your own colorbar graphic using your paint program and the colorbar guide provided here (see Figure 1 on page 18).

Feed your Amiga genlock/encoder output to the composite monitor and display a colorbar graphic from your Amiga onto the monitor. Memorize how these colorbars look. With a little practice, you will be able to visually set the chroma and tint controls at an acceptable level just by looking at the colorbars alone. Once you have mastered this, you can begin to eliminate oversaturation problems.

With your genlock/encoder output still connected to the composite monitor, use your paint program to make a blue rectangle and a red rectangle that touch each other. Look closely at the vertical edge where the two rectangles meet on your composite monitor. You will see a zipper-like strip that looks similar to millipede legs crawling up the edge—this is "chroma crawl." Adding more blue to the red and more red to the blue minimizes the crawl between the rectangles. Making colors more gray (less saturation) also helps. These types of adjustments should correct most offensive color combinations.

Outlining graphics in black also helps to avoid chroma crawl, but you obviously cannot outline everything, unless you are a cartoonist. The solution is to avoid the most offensive color combinations when creating video graphics, knowing that you will have to make many color compromises to obtain good-looking computer graphics for video applications.

Go Composite

Now that you have tried using a composite monitor to adjust your video graphics colors, get in the habit of doing so all the time. The most common mistake made by newcomers to desktop video is failing to use a composite monitor to properly set graphics colors. Do not be fooled by the colors on an RGB monitor. Once encoded into NTSC composite, your colors are not as rich—your aquamarine may look too green, or your rose may look tan. While this may be due in part to a misadjusted monitor, no amount of adjustment will make colors look exactly as they do on an RGB screen.

To avoid color errors and oversaturation, adjust your RGB colors (even if they look wrong) to achieve the correct image on composite. Remember, the true test of your video work is how it looks when played from videotape to a composite monitor or TV.

Here are some color palette-setting guidelines that will minimize oversaturation and chroma crawl:

1. You should generally avoid setting the RGB color sliders in your palette controls higher than 12 or 13 on the scale of 0–15.

2. White should never be R-15, G-15, and B-15. A better, warmer white is R-14, G-12, and B-12, and a nice, cool white is R-12, G-12, and B-14.

3. Video has trouble handling red, especially when recorded to videotape. Red made with R-8, G-0, B-0 or R-10, G-0, and B-4 is red enough for any purpose and minimizes the "red bleed" so common to video.

4. Pure blue of R-0, G-0, and B-15 is "noisy" on videotape. Blue made of R-0, G-1, and B-11 appears nearly identical to pure RGB blue when played on composite.

5. Pure green of R-0, G-15, and B-0 is too rich for video. A green of R-3, G-12, and B-2 looks almost the same as pure RGB green on composite and causes less chroma crawl.

6. A bright yellow of R-15, G-15, and B-0 can look washed out on composite, especially when used for text. A yellow of R-14, G-12, and B-0 provides more color and less luminance.

7. Turquoise of R-0, G-10, and B-10 or higher displays horrible chroma crawl. Even with green and blue levels below 10, the crawl is quite apparent. Adjacent colors have a tremendous effect on turquoise (as they do with any other combination). Turn down turquoise at least to the R-0, G-10, and B-10 level and use it only next to a color that contains a lot of green and blue, but no red. Your best bet is simply not to use turquoise.

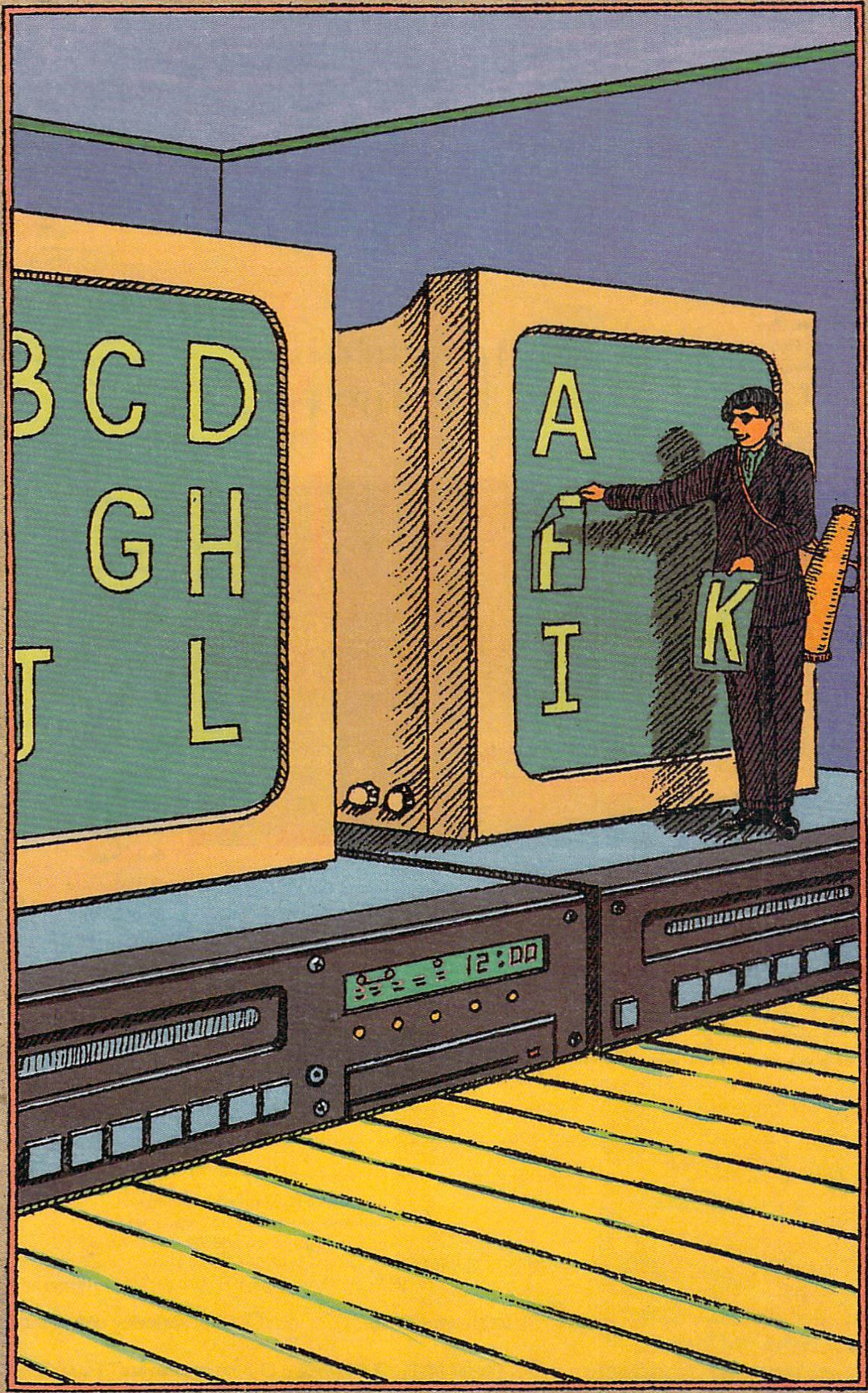
Making the Best of a Bad Situation

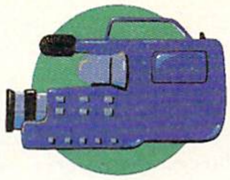
Chroma crawl is not the only problem you must deal with when working on video graphics. But because it is a product of the way NTSC composite is made electronically, it takes far more effort and diligence to avoid or at least minimize it. In fact, chroma crawl varies not only between genlock/encoders, but between monitors as well. The internal genlock of my more expensive SuperGen 2000 (Digital Creations) produces less chroma crawl than my SuperGen external genlock. By contrast, my most expensive Sony composite monitors exhibit more chroma crawl than my other Sony monitors that cost half as much. Hardware does affect chroma crawl, just as your camera and VCR or camcorder affect the quality of your taped image.

Chroma crawl is inherent in the composite signal, so you cannot eliminate it totally. Learn to cast a critical eye on your graphics work and take whatever action is necessary to make it better. To feel happier about your own work, take a close look at the vertical edges on your local TV station's weather graphics tonight. You will more than likely see some measure of chroma crawl.

Your efforts all boil down to what is seen on that picture tube when all the animating and editing are finished. In the end, TV is still NTSC composite, and until High Definition Television comes along, we will just have to make the best of it. ■

Fred Hurteau worked as a commercial artist for 12 years before opening his own video production and computer graphics studio, which specializes in Amiga graphics and corporate, educational, and commercial videos. He also teaches college-level courses on Amiga graphics and animation.


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12:00



Learning your Edit A/B & Cs

To tell your story well, you must know the basics of video editing. Here, a seasoned pro shows you the ins and outs of the edit setup and how to accomplish the task.

By Keith Nealy

What made Garrison Keillor such a success on the stage of St. Paul's World Theatre? It was not just the stories he told, but the way in which he told them. Like Keillor, a video producer is a storyteller. The way you tell *your* story depends greatly on how you produce your master tape. In other words, it depends on video editing.

Video editing is the creative process of assembling and ordering the pieces that make up the story, as well as introducing sounds, transitions, and other elements to make the delivery effective. Good editing does not call attention to itself; it simply presents the message in a way that engages the viewer. But don't take it lightly, because editing can make the difference between success and failure for your production.

How do you prepare for an edit? What comprises an editing system? How does video editing work? I will answer these questions to give you an overview of the process, and along the way I'll offer tips that can help you achieve good results. I will also define some of the terms that apply to video editing.

Preparatory School

Although editing actually takes place after you have shot your scenes or created your graphics images, doing a little prep work up front can make the process easier.

Do not wait until you finish shooting to think about editing. Before you create your video's scenes, choose an editing style. That way you can shoot your footage or organize your graphics to accommodate that style. Do you want to include the rapid jump cuts seen in up-tempo rock videos? Or do you want to give the impression of transporting your viewers to another place or time with dissolves, ►

ILLUSTRATED BY MARCEL DUROCHER

wipes, or fades? Each type of transition imposes a different style on your video.

Out in the field, roll your tape for at least five seconds before and after each scene to allow enough time code for your edit software to lock up with. Most edit controllers preroll all decks five seconds to allow for syncing up. You may need this time to cover for a dissolve or wipe; shooting short may force you to use a cut—whether you had planned one or not.

Finally, remember that movement and continuity are of paramount importance. Focus on how one scene will fit with the next, and try to visualize upcoming shots.

Following these guidelines will help you in the post-production phase of videomaking. After all, if you go into the edit without doing your homework, you will end up with problems to fix—and that is an expensive and time-consuming way to produce a video.

The Editing Studio

There are two basic system configurations for editing. Two-machine, or "cuts only," editing incorporates one source deck and an edit deck to let you compile a master simply with cuts between each scene.

Three-machine, or "A/B-roll" editing is more complex, but it lets you include dissolves or wipes between sources. To dissolve from scene 1 to scene 2, for example, the scenes must physically be on different tapes.

A/B-roll editing is a necessity for professional-level production and, unlike cuts-only editing, requires a stronghold of supporting hardware. For starters, you need a sync generator and a video-distribution amplifier so that you can synchronize every component in the system to a common signal, usually referred to as "house sync." The sync generator and video-distribution amplifier split the sync signal into many equal, amplified, signals and route them to the various components' External Sync-In connectors. This lets the components march to the beat of the same drummer.

You also need a switcher, which lets you choose types of transitions (cuts, wipes, or dissolves), select the various sources, and assign them to specific busses. NewTek's Video Toaster is a four-input switcher and a good example of low-cost technology. With it, you can also use two still frames as sources.

In order for the switcher to mix or combine the signals from different source decks, the decks must be in perfect sync and free from time-base errors. For this reason, each deck must have its own time-base corrector (TBC). (For more information on TBCs see "Operation Cleanup," p. 31, in this issue.) Most good TBCs are also full-frame synchronizers—that is, they can store and correct a full frame of video in real time. This lets you use unstable signals such as those from VHS machines.

Video cameras do not need time-base correction, because their signals are not subject to mechanical errors. They do need to be synced, however. A real boon to this chore is the full-frame TBC, which can align an unsynchronized, nongenlocked camera signal with the house-sync signal fed to the TBC.

Video and audio patchbays (panels of jacks that consolidate the inputs and outputs of each device) make routing the signal paths in various configurations easier; they save you from going behind the machines to rewire the "spaghetti."

Finally, to view your edit sources and output, you need monitors. While your source monitors can be small, black-and-white ones (you need one for each source), it is important to use a good color monitor for your actual program output. (One tip: use underscan mode to view the final output; all monitors crop the video, and only in underscan mode can you see the entire image.)

Bars and Tone

A good sync generator can do more than keep components marching to the same beat: it can also keep sources and components color and sound coordinated. Many sync generators include a color-bar and tone generator, which produces what is known as "bars and tone."

Because each source machine, camera, piece of tape, length of cable, and so on, alters the way the video looks, you need a standard of comparison. SMPTE color bars provide that standard, serving as common image and signal patterns to which you can align your TBCs. The Video Toaster provides a color-bar generator on Effects Bank D, Crouton 46. Having an independent one is more valuable, and it usually does not

Perfect Match

HERE IS A basic overview of how to match your TBCs if you only have the Toaster for a color-bar generator:

- Play a tape with prerecorded color bars on your "A" machine. This is usually the one that feeds into the Toaster input number 1 to provide sync to the Toaster.
- Play another tape with bars on your "B" machine, feeding into another Toaster input.
- Select a vertical wipe—either B33 or B34—and move it manually, so that it cuts across the top set of vertical color bars from both machines.

You should see a noticeable difference between the two signals. What you are trying to do is change the proc-amp controls on the "B" machine TBC to match the bars from the "A" machine, using the "A" signal as the reference standard.

Ideally, you want the wipe line separating the two signals to disappear, so that it looks like one image. If you can make that happen, you will have adjusted all the controls so that the signals match. Although this task is somewhat difficult, it is necessary. Once you grasp the concept of how each control affects the image, the process becomes easier. □

—KN

add much to the cost of a sync generator. (See the sidebar "Perfect Match" for guidelines on using the Toaster's color-bar generator to match your TBCs.)

You should make it a habit to record 60 seconds of color bars and a tone at the beginning of each source and master tape. (In the field, most good cameras can generate color bars, as well.) Then, every time you change tape in the edit suite, balance the new reel against the one that stayed up on the other machine. To make very precise adjustments, use a waveform monitor and a vectorscope. (For more information on these devices, see the sidebar "The Test Bench," on p. 98 of Joel Tessler'article "Still in Sync?") This practice keeps your color balance and synchronizes the signals.

The standard audio tone, usually 1000 Hz, helps you align the VU meters on all your equipment so that their sound levels are consistent. Run the tone into your audio mixer and set the faders so that the VU meters read 0 VU (the first red number on the right). Then set the meters on the record deck to read 0 VU. Now your mixer and record-deck meters are aligned with a standard VU reading and are compatible with other systems and standard tape levels. When you set your source levels by looking at your audio mixer, the edit deck records the proper levels.

Tape Talk

Another thing that helps keep things precise is tape addressing, which is very important in the edit process. The less preferable method of addressing is the control track, which results when you record a black-burst signal on the tape. A control track is a series of pulses that an editor or tape machine counts to mark its approximate location. Each pulse looks the same, so if you remove a tape from the machine, you lose count.

Time code, a much more exact system, "prints" a specific address corresponding to every frame of video on the tape's address track. It reads in hours, minutes, seconds, and frames, in the convention 00:00:00:00. (For more information on time code, see "Frames of Reference," p. 27.) Professional tape formats and machines have an address track allocated specifically for time code. Often, you can record time code on a format that does not have such an address track. (See the sidebar "The SVHS Dilemma.") Although you give up another track by doing so, it is worth it; once you edit with time code, you will never want to be without it.

Be sure to lay down time code on each tape before you shoot. This not only saves hours in the editing phase, but it improves the quality of your output (many formats will not let you stripe time code after recording without going down a generation). When striping your tape with time code, set your time-code generator to 1:00:00:00—or one hour—for tape number 1, 2:00:00:00 for tape 2, and so on. Then, while editing, you will be able to determine the reel from which a scene came just by looking at the time-code numbers.

To keep generation loss at a minimum, the format of your master tape should be of equal or better quality than that of your source tapes. Choose a mastering stock that is designed for editing, such as the emulsion Sony XBR. Also, always use fresh tape for your master.

Before editing, you must "crystal" your master tape, that is, lay down a black-burst signal and time code for the full length of the tape. Called "B and C," or black and coded, this tape is ready for editing because it provides a constant sync signal and continuous time code for frame-accurate insert editing.

Insert editing, the method professionals use, does not disturb the address track. It allows you to selectively edit the video or audio tracks independently.

The alternative, assemble editing, is less desirable because it involves replacing all video, audio, and address-track signals with new material, sequentially from beginning to end. The problem with this method ►

The SVHS Dilemma

ONE REASON MANY of us bought SVHS machines, aside from the picture resolution, was the ability to record Hi-Fi audio. Audio, traditionally the poor stepchild of video, has never been as good, because narrow, linear audio tracks move across the tape heads so slowly. Advertisements for SVHS touted not only Hi-Fi audio with better than 90db of signal quality, but a whopping four tracks of audio—two Hi-Fi and two linear. At last! A solution to our problems!

Then we realized that the Hi-Fi audio tracks are actually embedded in the video signal and cannot be edited without erasing the video. This presents difficulty for video editing, wherein you need complete and independent control of all tracks. So, for editing purposes, you are stuck with the two relatively poor-quality linear audio tracks.

Also, because SVHS has no address track for time code, adding it necessitates using one of the linear audio tracks as an address track. This leaves you with just one low-quality, linear audio track for your edit master.

To get an SVHS stereo sub-master, you can dub a prerecorded and mixed audio track (with the video master) to the video/Hi-Fi tracks of another machine. This involves losing a generation, however, and to maintain synchronization, you must lock the audio to the video master with time code.

SVHS is a great, economical format—if you learn to work within its limitations. Here is one tip: If you are using SVHS for your source reels, change tapes at least every half hour. When you get into the edit and have to shuttle back and forth on a two-hour SVHS tape to find scenes, you will see the value of short tapes (waiting for SVHS tape to rewind is like watching paint dry). □

—KN

is that you cannot change something in a previously edited section. Because the address track is replaced along with everything else, there is a noticeable glitch at the out point of the new edit.

One word of caution: With insert editing, your out points are every bit as important to the record machine as your in points. Without them, the edit controller thinks you are doing an "open-ended edit" and keeps recording over master material until you close off with an out point.

The Amiga as Manager

Being surrounded by all this hardware might be a bit intimidating if you did not have a way to manage it all. But, of course, you do. Boot up a master control program on your Amiga, and you turn your computer into an edit controller. An edit-control package lets your Amiga tell every component in the system where it should be and what it should be doing at any given instant in an edit. Until recently, editors were dedicated computers that did nothing else. Today, the Amiga handles this task nicely.

How does an edit controller keep control? Either through GPI (General Purpose Interface) or serial control.

GPI is nothing more than a trigger pulse. An edit controller can send out a GPI pulse at a specific time-code number to trigger an event in another device such as a switcher, sound-effects board, or laser-disc player. The more advanced the editor, the more GPI pulses it can generate per edit event.

Serial control, a more sophisticated method, is a relatively new development in editing. Rather than simply triggering other devices, serial control lets you tell devices exactly what to do, when to do it, and for how long. Under this system, devices can also respond to the editor to update its position and status.

The edit-decision list (EDL) is the backbone of professional video editing, and is something all video producers should use. An EDL helps you keeps track of your editing decisions. With it, you record in and out points for both source and master tapes, reel names, type and speed of transition, video and audio track-insert status, and comments for reference. The best way to compile one is to use software such as MicroIllusions' Edit Decision List Processor or the EDL program provided with your edit-control system. The EDL is valuable for transferring "off-line" edit information to the "on-line" edit.

Traditionally, off-line editing refers to a low-cost, cuts-only system, while on-line alludes to a professional edit suite complete with computer-controlled, high-end tape machines, switchers, digital-effect devices, and so on. With the advent of low-cost, high-quality equipment such as that available for the Amiga, however, this delineation is beginning to narrow.

The result of an off-line edit is a version of your video without all the bells and whistles of dissolves, wipes, or effects. Use it as a rough copy to show your boss, clients, or friends, or just consider it your workprint—it will help you to adjust timing and see the production take shape. If you are working on a cuts-only system, you can compile an EDL and generate an off-line production there, then rent an on-line studio to put out the final tape. (Nowhere is the phrase "time is money" more appropriate than in a rented on-line suite, where every hour can cost hundreds, if not thousands of dollars. There, your time-coded off-line production and EDL will pay off.)

In an Amiga-based on-line system, the edit controller prompts you, based upon EDL entries, to put the correct reels into specific machines. It pauses wherever there is an indicated transition, waits for you to perform the effect, and continues.

If you do not have an computer-based editor capable of generating a list, you can create one manually. After a video shoot, log all the scenes on the tape, noting the minimum number of in points on the takes and commenting on the usability of the shots. By ordering these notes according to your script, you can create a "paper edit."

A more precise way to produce this record is to create window time-code dubs (that is, dubs with the correct time code printed visibly on each video frame) of all your source reels. Then you can edit off line using the window-dubbed reel. When you finish editing, rewind the "master" and, reading the time-code, note the in and out frames of each edit.

If you generate a "tight," or precise, off-line edit this way, you can dub your time-coded windows directly to the master record machine. Then you can read the numbers from the screen while you replace each off-line segment with material from the original source reels.

What's Ahead

The future of video editing is exciting. The cost of the technology is dropping, while quality and capabilities are rising sharply. The recent developments of non-linear editing, video-disc editing, digital-audio workstations, and digital tape formats are beginning to change the way we think about editing.

But the most sophisticated computer with the most elaborate software is the one between your ears. Good editing is not all about high-tech video gear and EDLs—it is about telling a visually pleasing story. It is more about timing than time code, and quality rather than quantity. You are an integral part of your system. Your acuity and sensibility regarding design, pacing, music selection, and so on are as important for good results as any piece of equipment. ■

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Frames of Reference

Time code is a videotape editor's best friend. It lets you map frame by frame, so that you can make the best edits possible.

By Wayland Strickland

Imagine trying to edit a videotape accurately without a standardized reference system. You could describe the image at the point where you wish to add or remove footage, but one person's idea of "when the dog's mouth is slightly more than half open" is probably different from another's. You could use a watch to calculate the length of time from the start of the tape to the edit point, but you had better hope that you always start timing from exactly the same spot and that there's no subtle tape slippage that might throw your calculations off when you play your tape on a different deck.

A standardized system, time code takes the guesswork out of editing by identifying each frame of a videotape as a unique number of hours, minutes, seconds, and frames from a consistent starting point. For example, a frame marked by time code as 03:42:55:00 would be 3 hours, 42 minutes, 55 seconds, and 00 frames into the tape. Because NTSC (National Television Standards Committee broadcast-video standard) operates at 30 frames per second, the frames column begins at :00 and advances to :29, whereupon the seconds column advances by one.



A videotape with time code recorded on it will always reference its frames in the same way, even if the tape is played back in a different video-tape recorder (VTR). This pinpoint accuracy makes automatic A/B roll and single-frame editing possible.

The Same Numbers, But Different Languages

The two types of time code are named for the methods used to assign them to a tape: Longitudinal Time Code (LTC) and Vertical-Interval Time Code (VITC—pronounced "vitcee"). They are virtually identical in the information they provide—the only difference is the physical location of the information. ►

ILLUSTRATED BY PAUL YALOWITZ

LTC is an audible signal (much like a modem's) that is recorded on an available audio channel. Some videotape formats (such as ¾-inch, 1-inch, D-2, and M-2) provide a special audio track, called the address track, for recording time code (see Figure 1).



VITC is recorded as a series of white blips in the vertical interval of the video signal, usually found on line 17 of the video display. To view VITC information, you can play the tape on a monitor capable of underscanning, or you can adjust any monitor's vertical hold to display near the screen's center the black bar that is normally at the top.

Most Amiga products that support time code are LTC compatible. Examples of such products are ***RGB Computer and Video***'s **AmiLink** edit controller ($4380) and ***MicroIllusions***' **TCRG** (Time Code Reader/Generator—$799.95). Likewise, most consumer-level gear supports LTC. (In fact, the first VITC-standard consumer deck I have ever seen is the one recently introduced by Panasonic.)

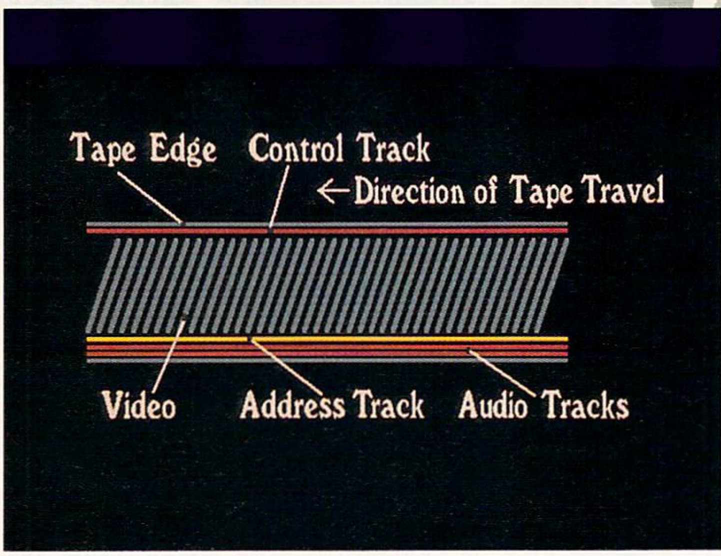


Figure 1. The anatomy of a videotape. Note the address track for longitudinal time code.

VITC is widely used in audio studios as well as post-production houses. With it, for example, sweetening a television show's audio is easy: Dub the show's audio with the accompanying LTC from the master videotape to a reel-to-reel or multitrack recorder; then use the time code as a reference for music, sound effects, and any other audio you wish to add. Next, match the reel-to-reel's time code with that of the master videotape to mix the sweetened audio tracks together, and, finally, dub the result back to the master videotape.

One of the disadvantages of LTC is that you cannot read it when the videotape is paused or in very slow forward or reverse motion. The videotape must be in significant motion for the time-code reader to distinguish the code signal from unwanted noise.

For example, on the raw tape of an interview the subject says, "I've, uh, enjoyed being on your show," and you need to edit out the "uh." Because you must mark the edit exactly before the "uh" in the audio, you will probably have to reduce the tape speed to one-twentieth speed to find it; however, your time-code reader is unable to comprehend LTC from the tape at this extremely slow speed. The only alternative is to mark in the edit start point while the tape is running at half-speed, then manually trim this start point and preview the edit, repeating this process until the exact frame is found—a time-consuming solution.

Because VITC is recorded on the video itself as a series of blips, you can clearly see it even when the tape is paused or playing in slow motion. This makes the VITC method more reliable, as well as being field (half a video frame) accurate. If you had used VITC for the "uh" example, you could have performed the edit in a matter of seconds by single-framing or "jogging" the shuttle knob of the recorder to the exact point of the edit.

Decoder Boxes and Boards

To read time code from tapes or add it to your own, you need a time-code reader/generator. (Although you can buy a read-only device, most units provide generation functions for just slightly more money.) These are available as either external units or as cards that plug into your VTR. The plug-in cards are the most desirable because they eliminate external cabling and can easily (in most cases, automatically) switch from generator to reader mode.

Another advantage to many internal reader/generators is their regenerate function. If you recorded only five minutes of a 30-minute tape but wish to time code the whole tape, you can instruct most plug-in cards to switch from generate to regenerate mode. The regenerate function reads the last frame of time code and continues it to the end of the tape, making the entire 30-minute tape sequentially time coded.

In either configuration, make certain that your generator permits the use of drop-frame and non-drop-frame time code (most do). Nondrop-frame time code runs sequentially from the beginning to the end of the tape. Drop-frame time code ignores two frames for each minute of recorded videotape—except for those minutes that are multiples of 10. For example, the frame following 3:59:29 would read 4:00:02. These frames are dropped in an effort to make up for the inherent problems in the NTSC color-television system.

NTSC originally ran at 30 frames per second when introduced as a black-and-white television system. When color was added, the new information that was encoded into the signal dropped the frame rate to 29.97 frames per second. Drop-frame time code is now the commonly used method in all US television stations and post-production houses. (Drop-frame code in LTC format is also known as SMPTE, which ►

stands for the name of the organization that developed it—the Society for Motion Picture and Television Engineers.)

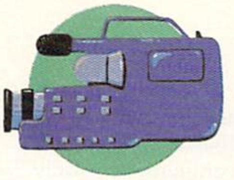
An equally useful feature of time-code generators is the ability to switch from free-run to record-run mode. In free-run mode the time-code generator supplies time code in a sequential fashion and continues to run even when the tape is not recording. In record-run mode, the generator stops producing time code as soon as the tape is stopped. Record run, however, does permit you to set a starting point for the time code. For example, if a tape is to be the third in a sequence, you can set the hours column of its time code to 3 to reflect this, meaning that the tape starts at 03:00:00:00.



Some external readers are able to generate window dubs, which are small, rectangular windows that display the time-code readout over the video. A window dub allows you to view a tape and its time code simultaneously on any player, even one that lacks a time-code reader. With this feature, for example, you could create a tape for a client to view at home and comment upon. Instead of vaguely describing problem spots to youin a later conference, the client would be able to reference exact time-code locations, which would help you tremendously in the editing process.

No matter which form you use or which features your reader/generator has, time code gives you a standard frame of reference. It enables you to locate edit points (frame-by-frame) with the utmost precision, whether for video, audio, or a combination of edits. Although the VITC is becoming the preferred form, LTC is still quite useful today for both audio and video editing. As time passes, LTC will probably be phased out and VITC will become the norm. But whatever the standard, time code is here to stay, and you won't want to edit without it. ■

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Operation Cleanup

Getting Your Video Signals In Sync

New low-cost time-base correctors now allow desktop videographers to do the kind of sophisticated video syncing performed previously by professional production houses using high-end equipment.

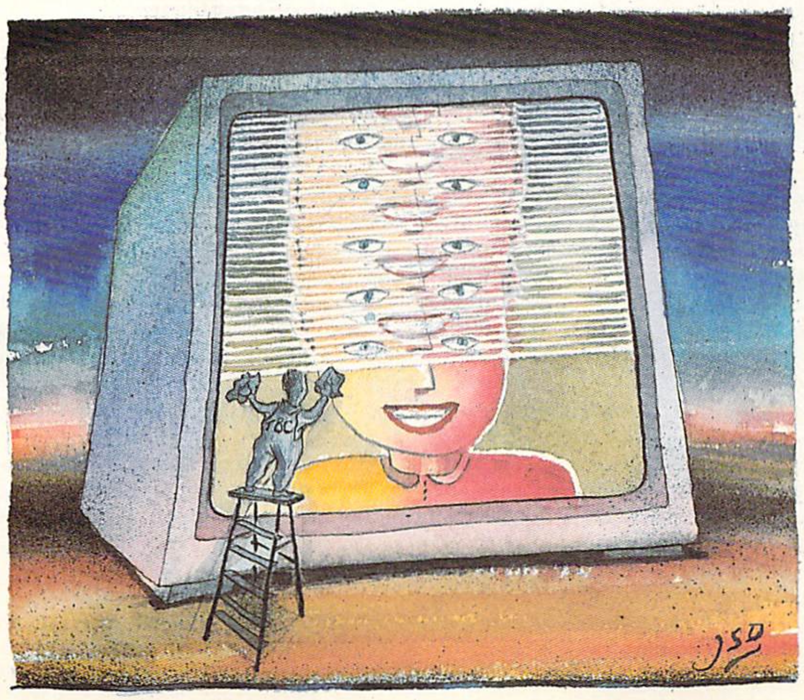
By Geoffrey Williams

No matter what you may think, understanding the basics of video sync doesn't take an engineering degree. And that is a good thing, because if you want to produce professional-quality video, you need to know the ins and outs of timing. The basics are not that complicated, and it will all make sense to you shortly.

Video cameras produce very stable signals, which is the reason you can use a single camera with ***NewTek***'s **Video Toaster** ($2495) without any problems. A camera's video deck is a mechanical device with video tape moving rapidly across spinning drums, so both the recording and playback processes can introduce errors into the video signal. But to understand the nature of a time-base error, which is what a time-base corrector (TBC) fixes, we first need to understand how a video image is drawn on screen.

Get the Signal

An electron beam excites phosphors on screen by tracing across them. It first passes over all the odd-numbered lines of the 525 that are available; then it passes across the even-numbered lines. It does this 60 times a second. Each set of odd- or even-numbered lines is called a field. A complete set of odd *and* even lines is called a frame—hence, the television frame rate is 30 frames per second. Scanning each line takes 63.5 milliseconds.



If, for mechanical or whatever other reasons, the electron beam does not scan each line in exactly 63.5 milliseconds, you get a time-base error. This can result in a variety of image-quality problems, from visible jitter to jagged edges. These timing errors can accumulate and cause flag waving (a rippling along the edges of the screen) or even make the picture roll. Monitors generally correct many of these difficulties, but if you try to record onto video tape, these problems become a permanent part of the picture.

To correct time-base errors, the TBC digitizes the incoming lines of video. An infinite-window TBC, which most now are, can digitize an entire frame. (Some older models can handle only a set number of lines at a time.) After doing so, it sends the frame along with clean synchronization produced by the TBC's internal sync generator. ►

ILLUSTRATED BY JOHN S. DYKES



Six different types of sync signals are required to display video, and all of these must be synchronized with one another. The mechanical variations that cause time-base errors can also cause sync errors, and without clean sync, the Toaster can't lock to the video signal to manipulate it. TBCs correct all these problems.

Adding multiple cameras and playback decks introduces further synchronization problems as the need for genlocking arises, so each device must have a TBC. Most of you are probably familiar with genlocks (see Joel Tessler's article on p. 96), which synchronize video signals with those from the Amiga, thus letting you key Amiga graphics on top of video. If the timing of the signals were different, overlaying graphics would be impossible. Although the overlay process is actually a separate function, you could not achieve the intended result if your hardware did not first genlock the signals.

The same principle is true for the Video Toaster. For this device to switch cleanly between two different video signals, they must be synchronized (genlocked) together—otherwise the video will roll, or you'll notice some other glitch when you switch from one signal to the other. Remember, a video picture is really a series of 525 rapidly drawn lines, with blanking between the bottom and top of the next field. Each video source must draw the same line numbers at the same time for the images to match up and be in sync.

Many professional facilities have a master sync generator (house sync) to which all the other video devices in the facility are synchronized. In most Toaster applications, one of the TBCs produces the master sync, and the other TBCs are synchronized to it.

Where's the Hold-Up?

Timing delays are another source of sync problems. Even cable length can affect the phase of a video signal, because it adds microseconds of delay time as the video signal works its way through the cable. A six-foot cable can add over nine nanoseconds of delay to the video signal, enough to shift the picture .0027 inches on a 19-inch monitor, which will be noticeable if you are switching between sources with shorter cables. One solution is to make sure all your source cables are the same length. Some TBCs, though, let you adjust the subcarrier phase to compensate for variations in cable length.

The Video Toaster itself can cause a major timing problem, because it takes about 400 nanoseconds for the signal to get out of the Toaster. If you have it hooked to a switcher that is connected to other video sources, the Toaster signal will be significantly out of phase with the other video signals. Fortunately, ***Allen Avionics*** provides a simple solution specifically designed to address the Video-Toaster delay problem. The company's **Pulse and Video Delay Line TDL 487** ($275) can add an adjustable delay of 360 to 487 nanoseconds. You need to add a Delay Line to each source that does not go through the Toaster.

The TDL 487 is a small blue box with one in and one out, and a series of seven toggle switches to set the delay time. Allen Avionics is a respected video manufacturer that makes a wide variety of delay devices, and this little box works as advertised.

Most TBCs also offer a proc amp (processor amplifier) that lets you adjust various aspects of the incoming video signal, such as the the hue (tint), chroma (color saturation), video (also known as luma, which adjusts picture contrast and brightness), and black (also known as setup), which controls the amount of black in the picture.

Even if you do not own a Video Toaster, a TBC is an important part of any video environment. Not only does it let you record a clean signal from one VCR to another, but with the proc-amp controls you can adjust the picture so that flesh tones look right and the image appears the way you want it. For any type of video editing, a TBC is an absolute must.

Just two years ago, a TBC was a very expensive proposition, with low-end units costing over $5000. With the introduction of the Video Toaster and the general desktop-video revolution on all computer platforms, manufacturers have been scrambling to release a new generation of powerful, low-cost TBCs. The two types available are rack-mounted, stand-alone units and those that plug into the PC slot of an Amiga or into an IBM computer.

Stand-Alone Units

We'll take a look at four recent entries, all under $2000. Hooked up to a waveform monitor and vectorscope in the studio, all of them fell within expected ranges for image quality. They differ slightly in features and capabilities, but all are good values. (These four, of course, are not the only TBCs on the market. Expert Services, Showline, and I.DEN are some of the other companies producing this technology.)

AP41

The **AP41** from ***Hotronics*** ($1295) has knobs on the front that control the video, chroma, setup, and hue. Its adjustable hue range of well over 90 degrees is significantly more than the other three TBCs we tested. If you are video sophisticated, you can use a screwdriver to adjust several front-panel options, including horizontal phase, picture position, and system phase. The last is useful when you're dealing with variations in cable length; it has over 360 degrees of control when used with the coarse-phase adjustment.

Buttons control most of the other features. You can operate in normal or bypass mode, you can select either composite or SVHS, and you can freeze field 1, field 2, or the full frame. Because they do not use comb filters, the freezes jitter slightly and are not useful for live situations. (According to Hotronics, an upgrade version will allow stable freezes.)

The AP41 also has a strobe feature—with a choice of 16 speeds—that freezes and displays fields in sequence. The unit has composite and SVHS in, and composite out. It features an SVHS-out option, advanced sync out, and genlock input, which forces the unit to lock to the incoming signal. (An LED on the front panel lets you know the unit is locked.) Another option is a dropout compensator, which helps eliminate white streaks.

The AP41 can display a picture at up to 11 times normal speed in fast-forward mode on a CR850, and a (barely) discernible picture at 20 times normal speed in reverse.

DPS-230

Digital Processing Systems' **DPS-230** ($1995) is a fully transcoding TBC, which means it can accept composite or SVHS signals and can output composite or SVHS ►

regardless of the format you input. It can transcode a composite signal from the Video Toaster into an SVHS signal. It also has a remote in and out, which means you can control it externally via a serial cable.

The DPS-230 includes four standard proc-amp controls. You press the button for each function, and then adjust the main knob for whichever one you selected. LEDs show when you reach maximum, minimum, and unity (the unadjusted base values). You can store adjusted values by using the same proc-amp buttons; hold them down for a second to store and recall settings.

The hue button doubles in the same way as a unity switch, which restores all the proc-amp settings to their unadjusted values. In addition, there are two switches that let you alter the red and blue values in the video signal, again using the main knob. Although buttons such as these are not traditional, they are clearly labeled, and LEDs show which functions are active, so they are easy to use.

One of the nicest features of the DPS-230 is its true freeze, which uses digital comb filters and gives a rock-steady image. To freeze moving video, you use the field freeze, and for still video, the frame freeze. Because the Video-Toaster capture of moving video is not very good, you can use the DPS-230 to do a freeze, and then have the Toaster grab the image, thus getting a much better picture. Because the TBC has remote control, you could create an automated grabbing system or do sequential freezes based on timecode—but someone would have to create the necessary software.

Other controls include horizontal positioning and Y/C delay adjustments, as well as control over the horizontal-genlock and fine-genlock timing when you synchronize to an external source. The DPS-230 can also display a viewable picture even at 15 times normal speed in fast forward, and at the full 20 times normal speed in reverse. This is indeed a full-featured unit.

Internal TBCs

DPS Personal TBC II

Also from Digital Processing Systems comes the **DPS Personal TBC II** ($995), which plugs into the IBM slot in your Amiga. (You can also, of course, use it in an IBM PC.) Plugging it into the computer does nothing more than provide power to the card. If you want to control it from the computer, you must also connect it directly to your serial port with the supplied connector, or else connect it internally, which avoids tying up the serial port. The instructions for the internal connection, however, need to be a little clearer.

The board has composite and SVHS inputs, a composite output, and a genlock input for synchronizing to other devices or house sync. There is no advanced sync output.

You control the board through the supplied control software (see Figures 1 and 2), which I liked very much. You use sliders to adjust the usual four proc-amp options and the horizontal position of the processed video (changing which does not affect the genlock timing). Sliders also let you adjust coarse and fine genlock timing when you synchronize to an external source.

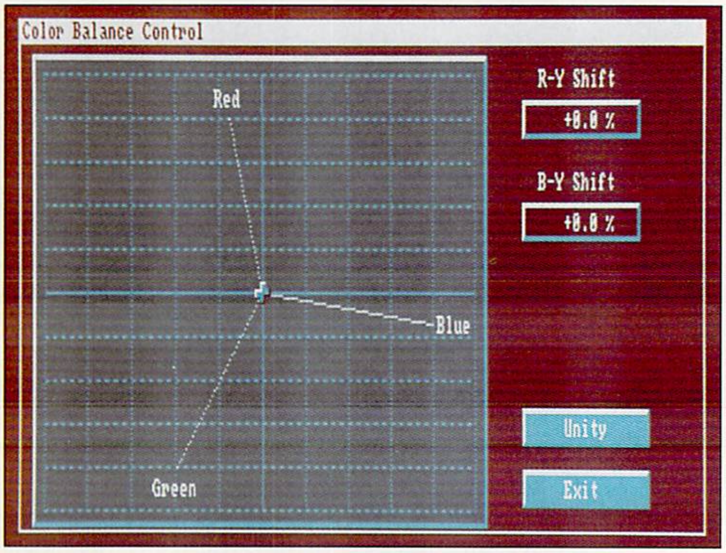
The company's color-balance control is especially nice. It displays the red, green, and blue color axes, and by moving the cross hair around the screen, you can adjust the red, green, and blue balance. With this feature you can do color washes and correct white-balance problems.

While the TBC II does have a freeze option, the picture jitters considerably and is only usable for off-line work (as the manual points out). The software can also store and recall all the settings, and it provides for multitasking with the Video Toaster.

The Kitchen Sync

Instead of software control, **The Kitchen Sync** ($1895, ***Digital Creations***) has an external controller box that plugs into the back of the board. While not as intuitive as software (you have to press buttons to cycle through and select the different options), this TBC is easy to use, and the LCD display lets you know exactly what you are doing. I was comfortable with it after just a few ►





Figures 1 and 2. The DPS Personal TBC II is controlled through well-designed, easy-to-use software. Sliders on the main control panel (Figure 1, top) allow you to adjust proc-amp settings, horizontal positioning, and genlock timing. Click on the Color-Balance button to get its control screen (Figure 2, bottom), where you can neatly adjust RGB balance and perform color washes.

minutes, and I liked holding the controller in my hand. The inputs and outputs are also on an external box, which means you don't have to get at the back of your Amiga to change connectors.

The Kitchen Sync is a dual TBC, enabling you to connect two video sources to it and have them both synchronized. It sports composite and SVHS in, SVHS out, and genlock-in with an advanced sync-out option.

The proc amp lets you control hue, saturation (chroma), gain, and setup (black), as well as luminance peaking, horizontal chrominance delay, and vertical advance. The TBC's freeze option provides a steady freeze of either field (best for scenes with fast movement) or full frame (for use with little or no motion in the scene), and is usable to digitize from or for rotoscoping. Because it features a serial-control option, if the company were to create software for it, you could use the product for remotely controlled freezes.

You can store three selections of settings, plus the original factory settings, and you can assign one of these to be loaded as the default set of parameters upon startup. You can adjust the horizontal centering of the picture and set the vertical lock mode to force either 525 or 625 lines, auto count, or injection. You can set the AFC gain to high (for VCR sources) or low (for stable sources). With the optional genlock function, you can control chroma phase and horizontal and vertical position, and you can turn on automatic jitter reduction.

Although normally you should not need to change them, a hidden menu gives you access to luma delay, luminance line-blanking (11 or 22), horizontal calibration (on or off), horizontal-drive delay (0us or +5us), vertical-drive constant (fast or slow), and calibration-gain controls.

One unique aspect of The Kitchen Sync is that if you are using several of them, you do not need to genlock them together. A simple jumper cable forces the other boards to take their sync from the first, so you may not need the genlock option even when using several sources.

SOMETHING'S MISSING

These four TBCs differ enough to provide some real choices, based on your needs and personal preferences. All of the products mentioned here do the basic job of correcting and syncing your video signal. You can base your choice on each product's extra features.

A consistent problem with all four is that their manuals assume too much technical knowledge on the part of the average user, offering almost no explanation of what different functions actually do. The DPS-230 manual does at least provide a brief summary of each of the proc-amp functions. A few extra words of explanation in the manuals would go a long way toward making these units more user friendly. ■

Geoffrey Williams is Executive Producer for Creative Business Communication and head of the Amiga Video-Graphics Guild. Write to him c/o AmigaWorld *Editorial, 80 Elm St. Peterborough, NH 03458.*

AMIGA PROFILE

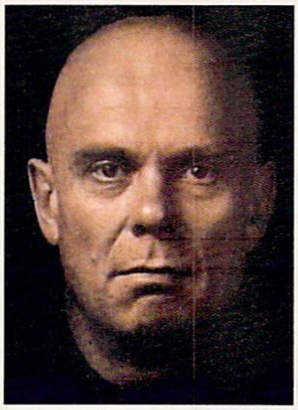
MAKING FACES

EVER WONDER HOW today's movie make-up artists come up with their amazingly real special effects? *Everett Burrell* doesn't, because he is himself a pioneer with special effects and makeup.

Burrell and his partner, *John Vulich*, own and operate Optic Nerve, a special-effects makeup company in Los Angeles. They provide a wide range of effects, from simple prosthetics and animatronic puppets to robot suits and custom-designed props.

While the partners use a lot of tools to create characters, their Amiga 2000, with its 100MB hard disk, 8MB of RAM, and a NewTek Video Toaster, is one of the most popular. (Burrell bought the Toaster mainly for its 24-bit paint capability, and he uses Toaster Paint every time he needs a hi-res, high-color image.) The Amiga serves as their design and sketch pad. First, they frame-grab photos. Then they load the digitized images into a painting or drawing program. After that, the sky is the limit.

Burrell's latest Amiga creation is George Stark, the alter ego of actor Timothy Hutton in the film *The Dark Half*, which is based on a Stephen King novel. For this movie, Burrell used a stock photo of Hutton, NewTek's Digi-View Gold, and Electronic Arts' Deluxe-Paint III. He and his partner made numerous images for the Stark character, which they then showed to the actor and his director, George Romero, before deciding on the final look. Hutton got a pencil-thin mustache, a crew cut, and a three-day growth of beard without ever reporting to the make-up trailer.





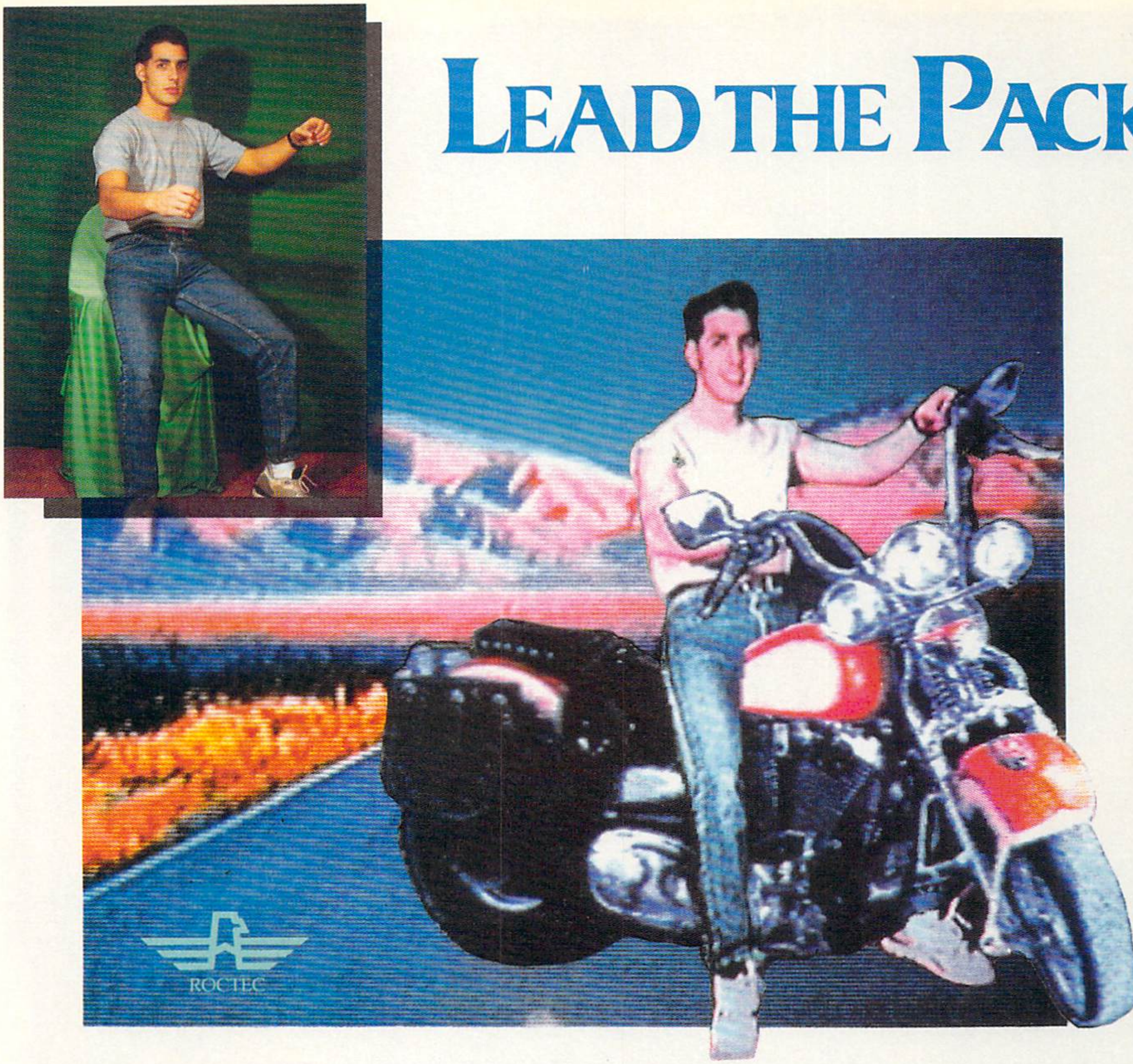
Make-up and special-effects artist Everett Burrell models his character creations on the Amiga—as in the "before" and "after" creation of the "Alien" character above.

The system they use also allows Burrell to experiment with weird make-up effects and faces, such as space aliens or ghouls. And if, say, a seeping wound needs to be moved from a forehead to a chin, the change can be made much more quickly on the Amiga than with drawings done by hand.

Optic Nerve has also created make-up effects for movies such as *Night of the Living Dead*, *Glory*, *Phantom of the Opera*, *Look Who's Talking*, and *Cocoon II*.

—Mare-Anne Jarvela

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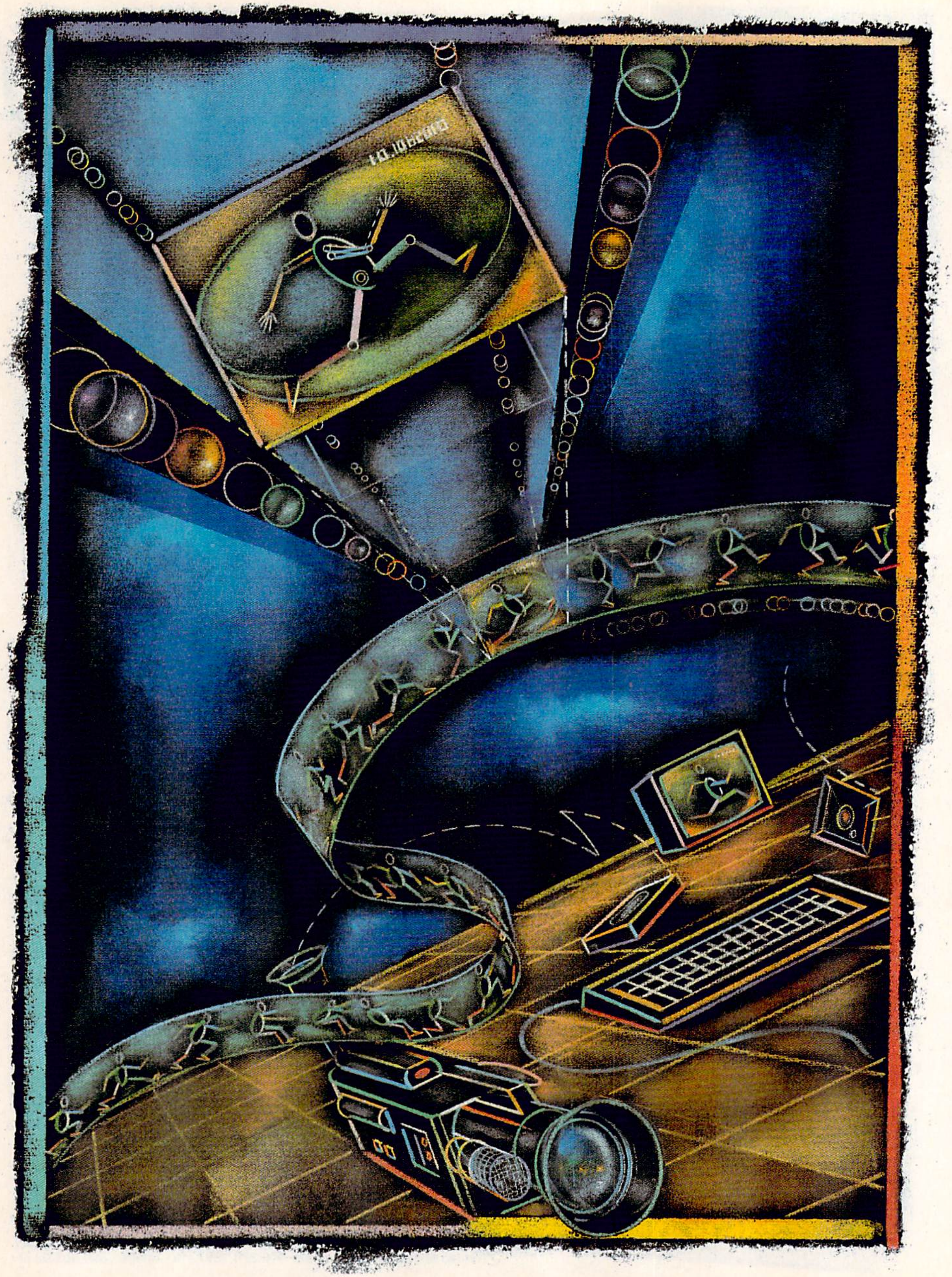
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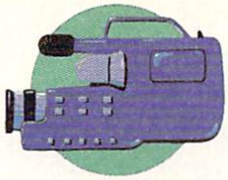
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ILLUSTRATED BY ANDRZEJ DUDZINSKI



PRECISION CONTROL

If you want to record your animations to videotape with professional accuracy, you'll need a single-frame controller (SFC) to get the job done. Here's a layman's guide to what an SFC does, how it works, and which ones are available for the Amiga.

By Lou Wallace

Although talent and creativity are two key ingredients for producing top-notch video and animation, having the most sophisticated hardware devices at your disposal doesn't hurt, either. After all, the cost of high-end equipment is falling as more consumers are pushing for better-quality video, so upgrading your studio is more feasible than ever.

If you have been thinking about taking the step to professional animation hardware, you probably are wondering about single-frame controllers (SFCs). In this article, we'll take a look at some commonly asked questions about SFCs and then examine three individual models currently available for specific use with your Amiga: the **BCD 2000A** ($995, ***BCD Associates***), the **DQ-Taco** ($1795, ***Diaquest***), and the **Nucleus Personal SFC** ($425, ***Nucleus Electronics***).

What Does an SFC Do?

A single-frame controller (SFC) is a hardware device used to control frame-accurate video-recording equipment. You can use the hardware alone to record sequential frames of user-generated video to tape (or other video media such as a recordable laser disc), or in conjunction with video-editing software to edit existing video scenes into a single sequence.

With the proper hardware and software, you can even use SFCs to digitize an existing video sequence and save the frames to disk, where you can work with them in paint and animation software. One second of video consists of 30 individual image frames. Adding a frame at a specific position is a difficult task that requires precise software and hardware control of the VTR.

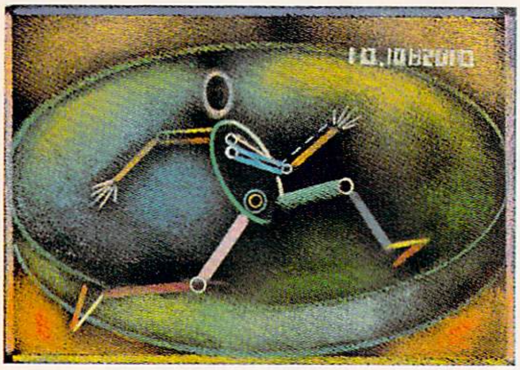
Most people, though, want a single-frame controller for creating animation. Today's Amiga animator has a wide range of professional tools from which to choose. In many cases, you can utilize these tools in conjunction with a single-frame controller and frame-accurate VTR (video-tape recorder). Those of you who use the Video Toaster's LightWave 3D animation package (NewTek), for example, can control several SFCs directly from within the software.

Even animation packages that do not include built-in control for SFC hardware offer utility programs that load and display prerendered images and send the proper commands to the controller. An- ►

imators working with Imagine (Impulse), for example, first save their images to disk, then use another software program supplied by Impulse to load the picture to that company's Firecracker 24-bit display card and to send control codes to the BCD hardware. Depending on your hardware and disk-storage capacity, this technique is preferred because it not only saves wear and tear on your video gear, but it also lets you easily alter or modify the images once they are saved to disk. Another benefit is that you can use the disk-based frames of the animation as an animated texture map within another animation.

How Do I Use One?

There are two essential requirements for using a single-frame controller. First, your video-recording device must be frame accurate, so that it can position the recording heads precisely. Second, you must have the ability to read and write some form of timecode—usually SMPTE. Although many an SFC offers a time-code read/write option, the best solution, if available, is to use time code generated by your VTR. You can often find the answer in an internal card for the VTR that you purchase from your video dealer. (For more on time code, see "Frames of Reference," p. 27.)



Virtually all video recorders that are used for single-frame animation come equipped with some form of serial (RS232 or RS422) or parallel port. SFCs have one or more options for attaching to the VTR. Make this connection with a cable that is appropriate for the ports on the VTR and the SFC. A number of VTR controllers now utilize infrared, or wireless, connections between the computer and the VTR, but none of the professional-level SFCs mentioned in this article use this approach. I recommend sticking with a physical connection because of the high-speed requirements for communicating between the computer, SFC, and VTR.

How Does One Work?

Although each SFC controls a VTR somewhat differently, there are basically two approaches. The first is employed when the animation software directly supports an external controller, as in the case of NewTek's LightWave 3D. From that program, you enter an SFC-specific command into the Record Command field. When each frame of graphics finishes rendering, the animation software sends this command, and the SFC receives it. The SFC then issues the proper commands to the VTR, performs a preroll, and inserts the video at the precise frame you specified.

Once you begin rendering the animation, the current frame pointer increments by one after each video frame is recorded to tape (unless you have specified otherwise). Sometimes before the rendering begins, though, you may need to define (via a time-code position) where the animation sequence starts. Depending on your SFC and software, you may be able to do this from within the animation program itself.

The alternate method of controlling the VTR is to render each frame of the animation, saving each frame to disk as either an IFF24 image or other supported file format (such as the Video Toaster's Framestore). With the proper software, you then create a list of image files that you want to load into your display device (whether it be the Video Toaster, Firecracker 24, GVP's IV24, Digital Creations' DCTV, Black Belt Systems' HAM-E, or whatever).

This list of images is loaded and displayed sequentially, and the proper commands are sent to the SFC, which in turn then controls the VTR and performs the video insert at the proper position on the tape. Keep in mind that you need not use exotic (or expensive) enhanced graphics hardware—this technique works well for standard Amiga display modes such as hi-res or HAM.

Not many people have more then a few megabytes of RAM, but even if you have ten to twenty megabytes, this translates into only a couple of seconds of real-time animation. With single-frame techniques, you can use DeluxePaint (Electronic Arts), Disney Animation Studio (Walt Disney Computer Software), Sculpt (Byte by Byte), or Imagine (Impulse) to generate a large hard disk full of IFF frames. Then you can render them to tape.

Now let's take a look at three SFCs designed specifically for use on the Amiga. The BCD-2000A and the DQ-Taco require an internal slot, so they work only on A2000/A3000-class machines. These cards use one of the Amiga's PC slots, but do not require Commodore's Bridgeboard to operate. The Nucleus Personal SFC functions on any Amiga with a serial port.

BCD-2000A

The BCD-2000A, BCD Associates' new SFC card, is designed for use in the A2000. Install it in one of the PC slots on the left side of the Amiga 2000, and use a ribbon cable to attach it to the internal serial-pin connector on the Amiga 2000 motherboard. This connection leaves the standard external serial port free. A3000 owners can use the card, too, despite the fact that the A3000 does not include the internal serial connection; you will need an optional adapter cable that runs out to the standard serial port. You purchase the 2000A configured for your video hardware, so be sure to specify what you need—RS232, RS422, or parallel.

The 2000A is basically a single-card version of the external, high-end, BCD-5000 single-frame controller (which is what *AmigaWorld* has in its video suite). By putting everything on one card, BCD reduced the cost considerably and passed on the savings to its Amiga customers. (Both the BCD-2000A and BCD-5000 are software compatible, so A500 owners can use the computer-independent model BCD-5000, and take advantage of BCD's single-frame techniques.)

Once you install it, you can begin to use the BCD-2000A in a variety of ways. Several on-disk programs offer different approaches to controlling your VTR.

BCDComm is a simple communications program that works much like a terminal program. With it, you can issue instructions to the 2000A, configure the communication parameters between the BCD and the VTR

hardware, and actually control the VTR directly by entering one of over 70 available commands. Use these commands to rewind, fast forward, play, search for a frame, step n frames, and define the type of video hardware you are using, as well as for more exotic tasks such as setting edit points, grabbing a frame (if you have the proper hardware), advancing a frame, and detecting frame motion. As long as you have some method of sending the commands to the BCD hardware, with these commands you can create complex applications.

To help you communicate with the hardware, the company includes a program called TellBCD, which you can run from the Shell or CLI, as well as from other software (such as AmigaVision) that can execute other programs. TellBCD is issued with one of the BCD commands as a parameter, which is then passed to the BCD hardware.

Those who work with CBM's AmigaVision use a driver (Player.DeviceDriver) to control the VTR from AmigaVision's laser-disc icon. Utilizing this driver in conjunction with TellBCD helps you generate powerful applications. ARexx programmers can control the BCD hardware with the BCDARexxHandler program. Using this with TellBCD and ARexx-compatible authoring tools such as AmigaVision should make it possible to create interesting mega-applications with the 2000A.

Control Solutions

The most extensive software program supplied with the BCD is VCS, or Video Control Solution. Use this mouse-driven program to calibrate the BCD hardware with your video recorder, control the video recorder directly using VCR-style commands, record existing DPaint-style animations, or even grab frames. The DPaint option is great if your DPaint animations are too large or complex for real-time playback on the computer. Using VCS, you can load each frame of the existing animation and record it to tape, ensuring proper, real-time playback.

The Video Control Solution's Grab Frame option is potentially very handy. In theory, this feature lets you grab frames of video from tape, digitize them using your graphics digitizer, and save them to disk. At this point in its development, though, it works only with the Video Toaster—and somewhat erratically at that. But BCD is working on the software, and at press time it was confident this option would eventually work seamlessly. The company is also looking into supporting other graphics cards, such as GVP's IV24.

If you are a professional animator who uses the Video Toaster's LightWave 3D (LightWave offers direct support to SFCs), you will be glad to know that BCD's manual includes instructions on interfacing its hardware with that animation software. First, run a program called SetBCD. It creates a file called BCDSetup.bat that contains all the information needed to configure the BCD hardware to your video recorder. Then, from the LightWave Record Setup menu, simply enter an EDOT x command (where x is the frame number you want the animation to start on) and an APND 1 command in the Record Command requester. When you start rendering your animation, LightWave sends the proper commands to the BCD hardware, which in turn controls the VTR.

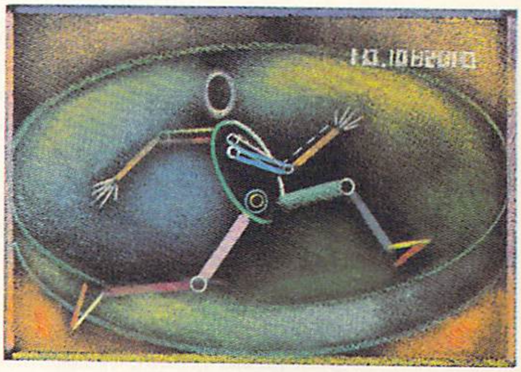
When I first started using the original BCD controller, the only software bundled with it was BCD-Comm. In the past year, the company has made great progress in designing the software portion of its product in a more Amiga-like and user-friendly way. The addition of the VCS program and ARexx support adds a lot of value to an already useful package. The supplied manual is thorough, if not extensive, although in some sections I found it a bit cryptic. BCD offers customers good support, however, and I always found someone ready to help when I phoned.

DQ-Taco

Diaquest's DQ-Taco is an SFC on a card that is designed to install into one of the PC slots in A2000-series machines. This device is unique in that with a single card it can directly support up to two different RS422-equipped VTRs. Thanks to this feature, you can use this device fairly easily as the foundation of a personal video-editing system.

The card uses a cable to join to the internal serial-pin connector on the A2000 motherboard. (It is the same connection the BCD-2000A makes.) Like the other two SFCs covered here, the DQ-Taco comes bundled with software that lets you communicate easily with the VTR. Unlike the other two, though, this SFC can handle any communications program that uses the serial port.

Working with the communication software, you specify the port you want to use with the port1 or port2 command. Then you issue a simple initialization command and, in most cases, you are ready to go. Some VTRs require additional set-up commands, but don't worry—the DQ-Taco documentation includes full instructions for over 30 video recorders. I was pleasantly surprised to discover that it includes information on configuring and setting up the VTRs themselves.



In the Toaster's LightWave Record Setup menu, you can issue the start command and set the edit in point, which indicates where to start recording the animation. In the Record Command requester, enter the command edit 1fp ^m, which tells the DQ-Taco to insert a single frame of video at the current edit in point. You can use other DQ-Taco commands here, as well.

A Commanding Presence

Like the BCD system, the Diaquest controller has numerous commands (more than 60) you can use to control the VTR. Besides the obvious ones such as play, fast forward, and still, it includes commands to grab frames, turn on time code, set in points, digitize, specify ports, and turn indexes on and off. With software at your disposal that can communicate with the serial port, you can use these commands to generate powerful custom applications.

The DQ-Taco was obviously designed with the Video Toaster user in mind. In fact, the documentation really ►

addresses its use only with LightWave 3D. Nevertheless, using other hardware and software is possible, as long as you are willing to render your images to disk and then use whatever display utility your graphics card requires to show the picture. When the image is displayed, encode it with a genlock (if necessary), and send the appropriate DQ-Taco command to the serial port to instruct the controller to add the frame to tape. According to Diaquest's tech-support representatives, the company is developing support for display cards other than the Toaster, but they would not be specific about which ones.

The DQ-Taco manual is quite good, especially in the sections covering the commands and VTRs. The command section is quite clear and comprehensive. As long as your VTR is supported by Diaquest, you should have no problem setting it up. If you have difficulty, though, the company's tech-support staff is quite helpful and responsive.



Nucleus Personal SFC

The Nucleus Personal Single Frame Controller is a serial controller that consists almost entirely of a custom serial cable and a lot of Amiga-specific code. Nucleus designed its package originally for use with the Toaster's LightWave 3D animation system, but the product grew quickly to support nearly every Amiga hardware device around. Hardware and display formats currently supported include the Toaster, Firecracker, ColorBurst (M.A.S.T.), DCTV, HAM-E, IFF, IFF24, RGBN, and Custom (to use hardware display drivers not already built in).

The hardware portion of the Nucleus SFC is a serial-to-RS422 cable that connects to the Amiga's serial port and the RS422 port of the VTR. According to Nucleus, this is not just a standard cable; the company claims it contains some proprietary circuits that aid in performance. The most significant portion of the Personal SFC is certainly the extensive software package. For LightWave users, the Nucleus software is extremely easy to operate. You can start it either before running the Toaster Switcher or after (use the Toaster's CTRL/CTRL/ALT/ALT keyboard command). Then return to Workbench and start the Personal SFC.

From the SFC main screen, you can use on-screen icons that represent standard VCR controls that record, play, pause, rewind, or fast forward your tapes. The screen even displays the tapes' time code continuously. There is also a graphics representation of a standard jog shuttle that you can control via the mouse.

A second control screen contains the Animation Decision List Manager. From here, you can perform such functions as striping a tape with video black and time code (your VTR must have a time-code reader/generator to do this) and defining the section of tape to place the animation as it is recorded. You can save the sequence list to disk and reload it later. This capability is always helpful, but in the event of a catastrophic power failure, it can save you an incredible amount of time.

The animation-sequence list is quite versatile. You can record any or all of your images multiple times, and every frame can have a different value. For example, normally you want to record each frame of the animation just once, with 30 frames equaling a single second of real-time animation. If you want to decrease the number of frames that make up a single second, though, you can record each frame twice (by twos). I have had success recording the first and last frames of my animations for 30 frames each. On several animations, I have held a single frame in the middle of an animation for one to two seconds, so that I could use it to display a message. By easily recording a frame multiple times, I can keep rendering time to a minimum.

Features Galore

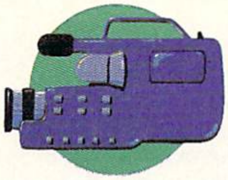
Another useful feature of the animation decision list is its ability to sequence, or loop, sections of an animation. Suppose you have a sequence that repeats several times, for example. Instead of just having the animation software rerender it n times, the Personal SFC software lets you loop a section of the animation. If you wanted the same 60-frame sequence to repeat four times, the software would record each frame of the animation four times, but 60 frames apart on the tape. The end result is that you render only 60 frames, but you have a continuous sequence of 240 frames on tape. This is a useful, powerful procedure that saves you and your Amiga time.

Other special features that are supported include both Stop Motion and Time Lapse photography, which make the SFC suitable for animation and video techniques outside the standard needs of animators. And, if you have all your images on disk, you can make use of a special preview technique that creates a thumbnail, black-and-white animation that you can view before you take the time to dump the animation to tape. For those of you who do not always have ready access to a VTR, this feature can be quite valuable. After all, it can be expensive to dump an animation to tape, only to find that it contains errors. With the preview mode, you can often find these problems and correct them before you get to tape.

Using this technique from within LightWave is quite simple. Once your animation-sequence list is defined from within the Nucleus software, simply return to LightWave and enter a T# in the LightWave Record Command requester; you are now all set to go. The Personal SFC intercepts the commands from LightWave and handles the VTR effortlessly.

All in all, the Nucleus Personal SFC is powerful, easy to use, and well integrated into the Amiga environment. Because it is the least expensive SFC on the market, and it works with all Amiga models, it is becoming quite popular in Amiga animation circles. Its manual is small but sufficient, and every support call to the company resulted in prompt replies.

Although I have focused on Amiga-specific SFCs, other controllers are available that should work nearly as well. BCD Associates also makes single-frame controllers that function with any serially equipped computer, and its Amiga software works with all its models. Lyon Lamb also produces a full line of animation controllers for computers, some of which work on the Amiga. Thanks to the Amiga's strengths in the areas of video and animation, it is no surprise that there is a good variety of single-frame controllers from which to choose. Which one you select depends on the hardware and software you use, as well as on the strength of your pocketbook. ■



Tag Team Toaster Tips

Your Video-Toaster productions will pack more punch when you bring the power of multiple programs to bear on the artist.

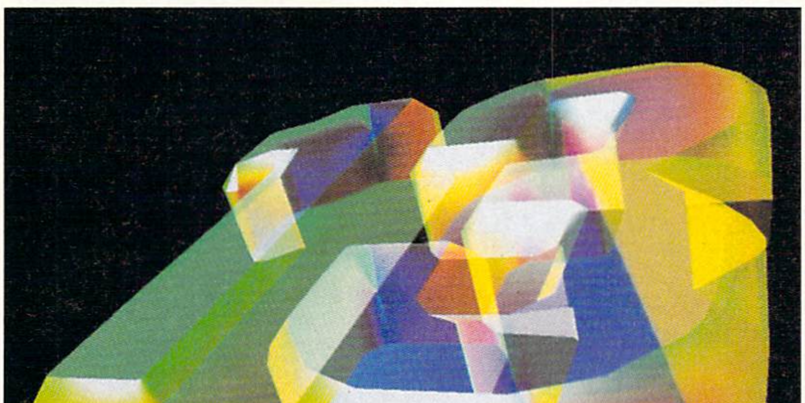
By Brent Malnack

By now, most Amiga users can recite the virtues of ***NewTek***'s **Video Toaster** ($2495) and the list of programs that accompany it—ChromaFX, ToasterCG, ToasterPaint, LightWave 3D. Far fewer, however, know all the subtleties of how these programs interrelate, possibly because many of the features are undocumented. Our two projects—using a ChomaFX color window as a background for computer graphics (CG) pages and as a reflection map in LightWave to produce a glassy look (as with the image in the accompanying illustration)—will demonstrate some of this untapped power.

Start in ChromaFX

We'll start our projects by creating the ChromaFX color window. Boot your Toaster and leave the switcher at the default effect, the top-left crouton. (This will work with any Toaster effect that does not use the framebuffers.) Enter ChromaFX by clicking on its icon. Now youcan select the effect you want as a background or texture map.

I chose the Solarize effect for the example. Don't worry: You need not have a video source plugged into your Toaster. Render the solarization by pulling down the T-bar in the ChromaFX control panel. When the effect has finished rendering, pull the T-bar again. Return to the switcher and select DV1 in both the program and preview bus. Press the space bar. You should now see a screen full of colors. Save this as a stillstore frame under the name ColorSpread.



You should practice the process a few times to get the hang of it. I also recommend experimenting with the diagonal and top-to-bottom button gadgets on the ChromaFX control panel. These may help you get the screen you need.

On to ToasterCG

In version 1.0 of the Toaster software, you cannot load stillstore images into the CG as backgrounds for titles. (Version 2.0 offers good news on this front; see the sidebar "Second Time Around" for more details.) The easy work-around of loading a stillstore image into one buffer and creating a CG key page to key the titles over it is no solution either, as you cannot save the combination of the two files. To place CG titles over another image, you have to go through a four-step process.

First, load the CG and find a blank page. Se- ►

lect a framestore page by pressing the function key F4. Press ALT-F3 and set the background color to black; the R, G, and B values should all equal zero. Type your text following these guidelines: Shadow and edge colors must have RGB values greater than zero (I start with R, G, and B at 30), and do not use transparent shadows. (CG pages with transparent shadows are actually 32-bit images—a 24-bit image with eight bits of alpha channel.) Finally, render the text, press ESC to exit ToasterCG, and save the screen as a stillstore image.

Put It Together with ToasterPaint

To combine your images, you load both of them into ToasterPaint. Start by loading the stillstore image (ColorSpread) that you saved from ChromaFX.

Render the image by pressing F10. Press the j key to enter the swap screen. Load in the page of text you created in ToasterCG and then press F9 to switch to the other Toaster framebuffer. The program monitor should turn black. F10 renders the image to the buffer. F8 and F9 will now toggle between the two buffers.

In the Brush menu, select No Background. This will ignore the black background and pick up only items that are different from the background color. Select the scissors and cut out some text. Press the j key; you should now be carrying your text brush over the ColorSpread frame. Stamp the brush down by clicking the left mouse button. F10 shows you the combined image. Be sure to keep track of what is in each buffer at all times. Using the j key and the F8 and F9 keys, continue to cut and paste until you produce the proper image.

A second way to work with text in ToasterPaint is to save your text in the CG without any shadow or edge. Add the dropshadow in ToasterPaint by cutting out the text as described before, selecting the Darken paint mode, and stamping the brush. To make it dark ►

Second Time Around

BY THE TIME this article appears in print, NewTek will have released version 2.0 of the Video Toaster software, the first major upgrade in Toaster performance. What changes and improvements can you expect? Here's a program-by-program breakdown. (Be advised, however, that 2.0 was not complete at the time of this writing; some of these features may have changed in the final version.)

ChromaFX

You can now use ChromaFX output with other Toaster effects on the fly. So, in addition to radically altering the colors in your video, you can flip it around. For even more convenience, you can now store up to four of your favorite ChromaFX effects for instant retrieval from the switcher screen without having to enter ChromaFX to render them.

ToasterCG and ToasterPaint

Both of these programs have remained relatively unchanged for 2.0. A few bugs were fixed in them, and some ChromaFonts were added to ToasterCG. The major new feature in both is access to a Global RGB buffer. Frames grabbed by the Toaster switcher now are instantly available in these programs—you need not save them first. In addition, you can load these frames directly into the CG as backgrounds.

Switcher

The most obvious 2.0 additions to the switcher are its 60+ new effects (called AnimWipes). Unlike any wipes on even the costliest professional DVEs, these are not geometric shapes, but organic wipes, such as billowing smoke, flowing water, turning gears, and shattering glass.

Less spectacular, but equally welcome, is the news that the file size of Toaster framestores has been reduced. NewTek wrote its own compression techniques to shrink file size to below 50K in some cases. The best part is that there is no degradation in image quality or in load time. Also, they have removed the infamous zipper on the right edge of the file.

LightWave 3D

Users of LightWave 3D 1.0 will barely recognize the 2.0 version of the program. It received the most thorough overhaul of all the Toaster programs. Here are the highlights:

- You can now metamorph surfaces.
- When morphing objects, you can transform the original object into multiple target objects.
- The rewritten reflection-map routines eliminate the blocky pixels that occurred as the camera backed away in version 1.0.
- Two rendering modes were added—Super Low-Res and Print Resolution. The former has a resolution of 192× 120 and is incredibly fast. The latter has a 3072×1920 resolution and is somewhat slower, but it is perfect for slides and transparencies.
- A refractive index requester was added, which letsyou generate different types of transparent materials—hollow glass, solid glass, water, crystal, and more.
- You can load framestores directly into LightWave as texture maps.
- The bounding-box preview in Scene Layout mode eliminates the lengthy wait when animating complex scenes. This leaves all objects as bounding boxes for the preview—perfect for early path creations. I wish NewTek had gone further to allow users to specify which objects would be boxes and which would be displayed in wireframe.
- You can set linear motion in Scene Layout mode.
- It now does ray tracing.

LightWave Modeler

Many features were also added to LightWave Modeler. For example, such object-editing functions as Shear, Twist, Taper , Bend, and Skin are now included. To prevent producing illegal polygon normals with some of these new tools, you can also triangulate anything in the volume window. For more precise editing, 2.0 lets you add and remove in-between points in a polygon.

If you prefer to import your objects from other programs, you have much more flexibility. LightWave Modeler 2.0 loads a host of object-file formats, such as AutoCAD DXF, AutoDesk 3D Studio, WaveFront, Swivel 3D, and Imagine.

With such an impressive roster of revisions and additions, version 2.0 should be well worth the $395 upgrade charge. Try it out! □ *—BM*

enough, you may need to press the a key to perform the function again. After producing the dropshadow, select Normal paint mode and place the brush again slightly offset from the dropshadow. This produces a nice transparent type of dropshadow around objects and text.

(As a sidenote: In ToasterPaint and LightWave, you can use the Right-Amiga-M and Right-Amiga-N key combinations to jump to and from Workbench if a CLI or Shell window is open.)

The LightWave 3D Connection

To use your ChromaFX framestore as a reflection map in LightWave version 1.0, you must first save it as an RGB image in ToasterPaint. Give it a name such as ColorSpread.RGB.

Now let's create an object to map ColorSpread.RGB onto: Enter LightWave Modeler and load the letters of your name from the included Common Font set. (If you haven't used the Modeler before, you might want to consult the manual on using separate layers and moving things around.) Save your name as an object, click on New, and reload the object.

Next, copy your object into layer 2 by clicking Copy, the second layer button, and then Paste. Select all the polygons with the Stats command and choose Flip from the Polygon menu. Save layers 1 and 2 together as one object. When emulating a glass object, using two-sided polygons makes matters easier. Click Merge to get rid of all unnecessary points, and then resave the object.

Now, enter LightWave, load your object, and click on Layout. Place your name so that it is close to the camera and rotated on its back (Pitch) slightly. Create a key frame. Exit Scene Layout.

You're now ready to map your ChromaFX image onto your object, creating a glassy look. Under the Surfaces menu, set the transparency level of the Common Fronts to around 80%. Set the reflection-map level to 30% and the reflected image to ColorSpread.RGB. Specify glossiness as low, the diffuse level as 40%, and the specular level as 100%. Change the current surface to Common Sides, and set the transparency level, reflected image, glossiness, diffuse level, and specular level as for Common Fronts. This time, however, specify the reflection-map level as 50%.

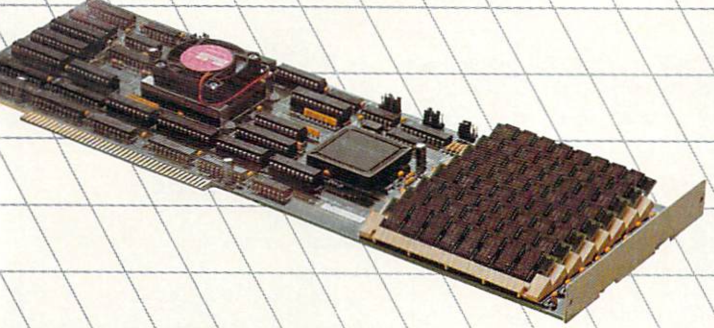
Now, simply render a frame and you are all finished. As in the example image on the opening page, you should see a nice reflection with lots of intense colors around the sides.

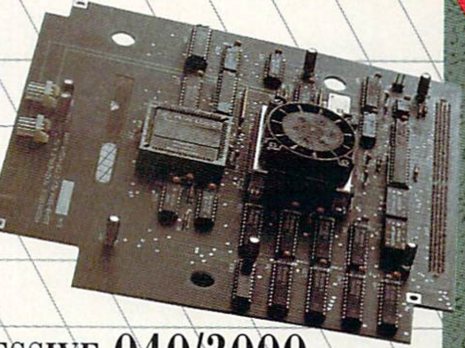
These two projects are just a sample of what you can accomplish by using the various Toaster programs in concert. With a little imagination, and enough RAM, you'll be surprised at the results you can achieve. ■

Brent Malnack, formerly Product Manager for LightWave 3D at NewTek, is now Art Director at Great Plains Motion Picture Co. He frequently lectures on video and computer graphics, and writes a monthly column on the Video Toaster for AV Video Magazine. *Write to him c/o* AmigaWorld *Editorial, 80 Elm St., Peterborough, NH 03458.*

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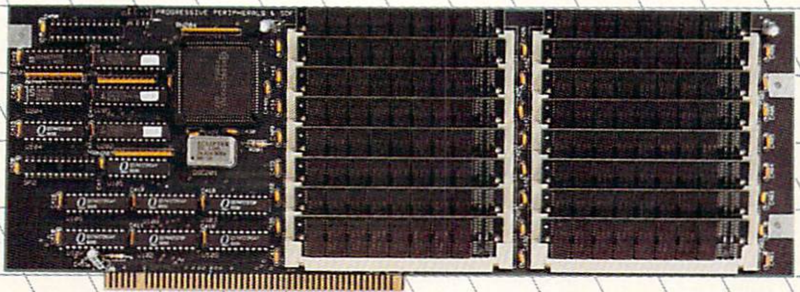
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Rambrandt offers workstation power for desktop video, multimedia, industrial and scientific applications, on the Amiga computer. For video and graphics professionals, and industries demanding high-performance graphics and video workstations, the Rambrandt Amiga system offers features and performance at a revolutionary price.

Rambrandt has two frame buffers with adjustable resolutions of up to 1024 x 1024 pixels per buffer in 32-bit color. The Rambrandt twin-board graphics system is based on the Texas Instruments TMS34020 40MHz 32-bit graphics processor, with 34082 graphics/math coprocessor.

For video and graphics applications, Rambrandt has composite and RGB video input, and composite and genlockable RGB video output. Through Rambrandt's RGB and composite video output, displays of 16.7 million colors are possible in resolutions up to 1024 x 1024. Rambrandt can digitize video from a variety of sources in 16.7 million colors in real time - 1/30th of a second. The dual buffers can be linked for a contiguous, scrollable work area of up to 2048 x 1024 pixels.

Rambrandt's standard configuration is two four-megabyte banks of fast video RAM (VRAM) and eight megabytes of RAM (DRAM) for resident application software. NTSC and PAL versions are available to support video and graphics applications worldwide. Rambrandt is an ideal system for video and graphics work, multimedia, computer aided design, medical industry, industrial and scientific simulations, and entertainment industry applications.

For film and video production work, Rambrandt is capable of an unlimited variety of digital video effects such as flipping, page turns, colorization, solarization, polarization, up to 8:1 zoom, rotations, picture-in-picture (PIP), live resizing, digital graphic overlay, and many real-time 24-bit animation and digital video effects.

For graphic work, Rambrandt is a star performer. Its high-resolution, double-buffer architecture with true 24-bit color and 16-color overlay makes interactive 24-bit painting easy. Pixel level control and 8:1 real time hardware zoom give graphic artists capabilities to create stunning images in 2-D and 3-D. Rambrandt's coprocessor with built-in 3-D functions will render three-dimensional scenes and animations with incredible speed and clarity. Rambrandt's hardware abilities to compress and display images make it the ideal host for a graphics database. Rambrandt can provide 3-D modeling and graphic software power found previously on workstations costing tens of thousands of dollars more.

Desktop publishing in high resolution, black and white or 24-bit color is fast and efficient with Rambrandt. With scrollable work areas of up to 1024 x 2048, Rambrandt offers desktop publishing capabilities going far beyond those currently available in the personal computer market. Computer-aided design software can take advantage of Rambrandt's high speed, built-in drawing and calculation abilities. For architectural and engineering design, Rambrandt offers CAD muscle to finish projects faster. Screen redraws and object calculations are virtually instantaneous, translating ideas into visual images in fractions of a second.

Rambrandt's blinding graphic processing speed offers tremendous potential to the industrial and medical market. For graphic and scientific simulations, Rambrandt has the power to process hundreds of thousands of variables and calculate complex simulation systems, producing high-quality visual results. Simulations may be displayed in real time on monitors and recorded to tape for presentations. Medical applications such as magnetic resonant imaging (MRI), chemical and molecular modeling, biological simulations, and many more are possible with Rambrandt.

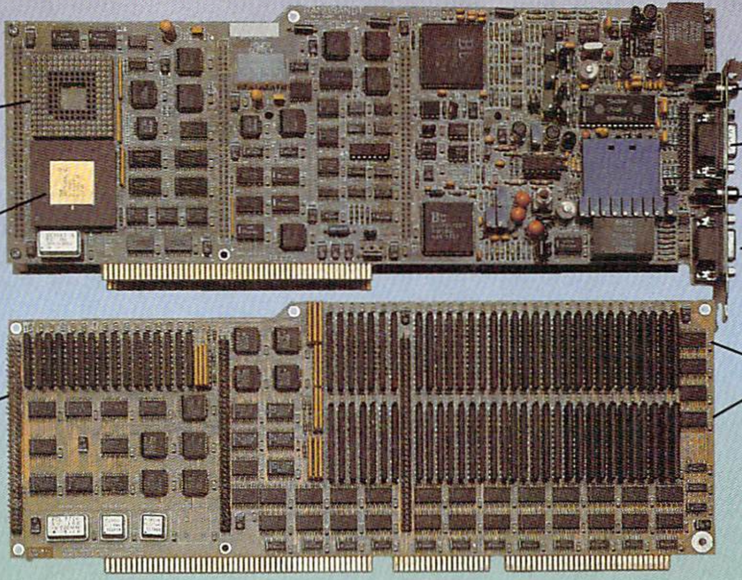
Hundreds of image processing functions are built in to Rambrandt's hardware. Image enhancement, image recognition, histography, and many other functions can be processed with blinding speed. Application software for scientific work, such as geology, seismology, astronomy, and other branches of science can take advantage of Rambrandt's image processing engine.

Rambrandt is a landmark for the entertainment industry. Interactive simulations can run in 24-bit color and high resolution, creating realism and excitement, taking entertainment software to the limits of game designer's creativity. Real-time flight simulators, fast-paced three dimensional action/adventure games, and other spectacular software can tap into Rambrandt's resources to create stunning new video games. Rambrandt opens doors for new concepts in entertainment, at a revolutionary performance vs. cost factor.

Simply stated, Rambrandt represents the state of the art in multimedia and graphic workstation power. The multi-faceted Rambrandt integrates professional desktop video, graphics production, desktop publishing, CAD and many other functions. No other single product offers such an elegant and powerful solution to such diverse applications. Rambrandt's visionary design will satisfy the increasing demands of many industries. Several man-years of professional hardware and software engineering have gone into Rambrandt, to assure that Rambrandt will meet the demands of not only users, but also application developers. Rambrandt's not only easy to use, it's easy to develop for.

Rambrandt offers unique software compatibility to the development community through its Standard Amiga Graphics Extension (SAGE). PP&S and Digital Micronics Inc. (DMI), with Commodore's cooperation, established this standard at the Amiga Developer's Conference in Denver. SAGE provides a simple and efficient way for developing applications which are compatible with Rambrandt, DMI's Resolver, and other 340x0 hardware products. SAGE libraries are available to other manufacturers who wish to enter the market. SAGE has been enthusiastically received by the Amiga Developer's Association, and a number of major Amiga software development companies have expressed commitment to SAGE. Developers interested in SAGE can obtain the professional developer's kit, which includes manual, SAGE libraries, and source code examples. This complete kit is available for a nominal fee.

Rambrandt is compatible with Amiga 2000 and Amiga 3000 series computers, AmigaDOS 1.3 and 2.0, in NTSC and PAL versions.



Technical Specifications

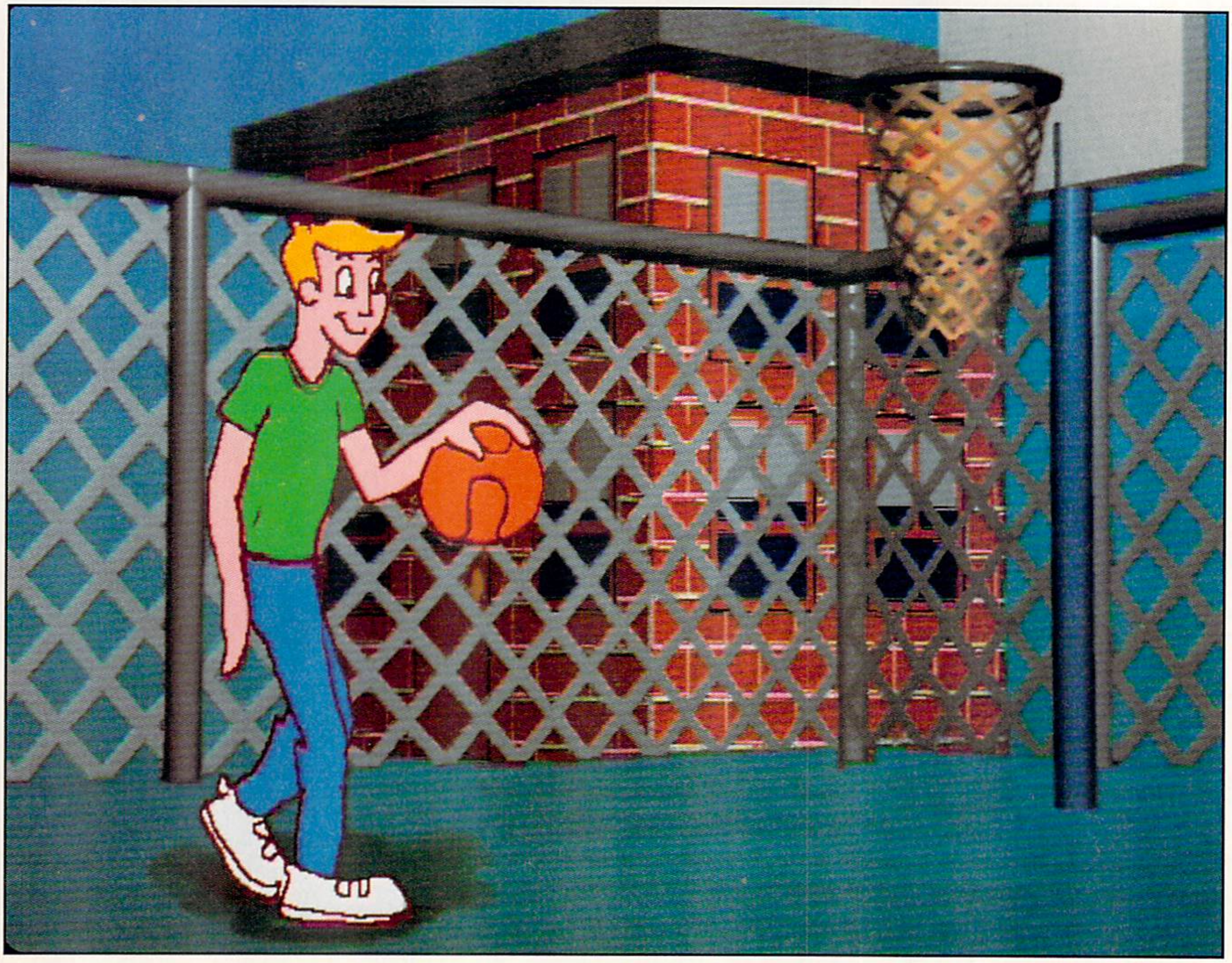
TMS34020 PROCESSOR:	40 MFLOPS peak speed at 40MHz 32-bit architecture with 512-byte Cache
TMS34082 COPROCESSOR:	32-bit math/graphics coprocessor Onboard 3-D Vector Support and rendering engine Parallel Processing Capability
MEMORY:	8 Megabytes of 44C251 1-megabit VRAM Pixel/bit-aligned block transfer rate of 142 megabits/second 8 Megabytes of DRAM for resident applications
INPUT:	RS-170A (Composite), CCIR-624 (PAL) and RGB (DB9 Targa Pin-Compatible)
OUTPUT:	Externally synchable RGB (DB9 Targa Pin-Compatible), RS-170A (Composite), CCIR-624 (PAL)
RGB RESOLUTIONS:	Variable from 320x400 to 1024x1024, in 8 or 32 bits, 1024 x 2048 scrollable work area by combining buffers. *Non-interlaced:* 320x400, 384x480, 640x400, 640x480, 512x512, 640x640, 800x600, 800x640, 1024x512 *Interlaced:* 800x800, 1024x768, 1024x1024 Thousands of other custom resolutions possible.
COMPOSITE RESOLUTION:	768 x 480 (NTSC), 768x576 (PAL)
PIXEL DEPTH:	8-bit or 32-bit, user-definable
HORIZONTAL SCAN RATE:	Programmable 15.734 KHz (nominal NTSC), 15.625 KHz (nominal PAL), Range 15 - 34 KHz
VERTICAL SCAN RATE:	Programmable 30 Hz (nominal NTSC), 25 Hz (nominal PAL) Range 25 - 100 Hz
INTERLACE:	Programmable 2:1 Interlaced, or Non-interlaced
AMIGA BUS INTERFACE:	4 x 128K DMA blocks, directly addressable Hue, Saturation, Contrast: Software adjustable via digital pots in 256 levels each
PALETTE:	16.7 million colors displayable from a palette of 16.7 million colors Alternative display of 256 colors from a palette of 16.7 million colors
OVERLAY:	8-bit Alpha channel with 16-color overlay Alpha channel color key between buffers
IMAGE CAPTURE:	Full frame and field capture in 1/30th or 1/60th of a second Real-time image capture in 24 bits up to 1024x1024 resolution Gray scale image capture in 256 shades Multiple resolutions in composite and RGB, up to 1024x1024
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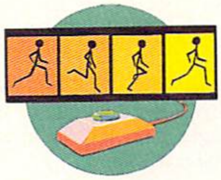
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By Steve Segal



Fundamentals of THE GAME

When people ask why I got into animation, I am at a loss to come up with an answer. The kid within all of us loves cartoons, so these people really should ask, How come we *all* aren't animators? This question becomes especially appropriate for those owning Amigas. You see, one of the great things about this machine is that you can use it for all phases of animation production.

When you begin the project, use your Amiga to create the storyboard. Instead of applying ink to paper, though, sketch your animation in broad strokes on screen. Next, plan the layout—compose the scene with characters and decide how you will digitize, paint, or render the background. Then move on to the next step, drawing and coloring your animation—the Amiga becomes a fine palette. And don't forget the sound—your Amiga helps you create a sound track and synchronize it to the animation. This machine even helps you through the last phase of your project—recording animation to and playing it back from videotape or film. Now let's take a closer look at these important steps of animation.

What's the Story?

Designing a storyboard is the first phase in the animation process. By creating a comic-strip-type outline of your character's movements, with each panel representing several seconds of the animation, you can keep your project organized (see Figure 1).

If you design the storyboard on your Amiga, you have even more control, because you can make revisions quickly and easily. Draw the panels with a graphics program such as ***Electronic Arts*'** **DeluxePaint IV** ($149.95), and then print them in a standardized format. You could sketch the panels one frame after the other and use painting tools to speed up the process.

But don't stop there. You can also use your Amiga to display the storyboard. By presenting the panels one at a time on a TV screen and controlling the timing with your hardware system, you can make your storyboard much more realistic. You may even want to sketch on paper, then digitize those drawings and play them in sequence. Inserting and deleting frames to adjust timing is easy with this method, too.

Creative Planning

As you work out the design phase of your production, you need to make some decisions about resolution and playing speed. If you are recording your animation on a single-frame recorder, the resolution is not as critical (as long as you have enough storage space on your hard drive). But if you are like most ►

of us, you need to record your animations right out of the computer in real time. Naturally, you want the maximum number of colors and the highest resolution, but, like everything else in life, it costs—the price is speed.



Like all good animators, you must plan ahead. Before you put your image on the screen, you must think about its complexity and color. Try to determine the part of the scene that has the most changes per frame and the most complicated imagery, and then make a small test animation of it. Pictures that include a camera pan on a background of a dithered sky, for example, may well bring trouble. In this kind of scene, the sky changes a lot along each scan line, and the color is different from frame to frame. This design may not play fast enough, causing you to rework your picture at the last minute.

There is a way to get what you want from a scene without paying such a high price. Think about reducing the number of colors, the amount of overscan, or the resolution in general. Instead of panning the sky, pan the foreground and leave the sky static. Or simply create a sky with less dithering. If you really want to get fancy, you can pan a lo-res sky, record it on videotape, and then play back the tape with the high-resolution animation genlocked over it.

Your audience probably will not notice the lo-res images as long as the main focus is the higher-resolution animation. I have even gone so far as to aim my video camera at the computer monitor, throw it out of focus slightly to soften it, and then genlock animation over that. Use your creativity—but plan ahead. If you do not, you may need to rework your cartoon later.

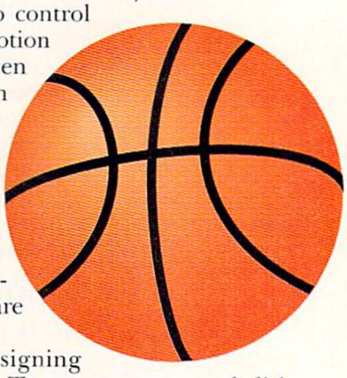
After you have carefully thought out your images, plan them precisely on screen. This stage is known as the layout (see Figure 2). Layouts are tight representations of each scene that help you create the background and animation accurately. (In live action, this would be the equivalent of a set designer and cinematographer combined.)

DeluxePaint is a good program for creating both hand-drawn layouts and the final background painting. If you save the layouts with just two colors, you can load them into **The Disney Animation Studio** ($129.95, ***Walt Disney Computer Software***), which is probably the best tool for the drawn-animation phase, and then press the F4 key to set the background reference to pop to the front whenever you want to see it. DeluxePaint IV also has a feature that lets you see the spare screen while you are drawing. If you make the layout lines a different color, you will not confuse them with your animation lines.

Three-dimensional packages such as **LightWave 3D** (bundled with ***NewTek***'s **Video Toaster**, $2495) and **Imagine** ($350, Impulse) are powerful layout tools. These programs let you build your pictures the way an architect or engineer designs—you can try different camera angles instantly. After you render the scene, you can use it as a background painting.

Getting Down to Business

When you have completed all that groundwork, you can move on to drawing and coloring your animation. If you have the right tools in hand, though, this process becomes a lot easier. DeluxePaint IV is a powerful animation program because it can show you the previous frame and give you full control of color. The Animation Studio lets you see the previous three frames and gives you powerful control over timing. You may want to use both. I do.



With The Disney Animation Studio, you can use the exposure-sheet option to control the timing and get the motion just the way you like it. Then you can save the file as an ANIM file and load it into DeluxePaint to color and composite the materials. You can color the animation with The Animation Studio or DeluxePaint, but I recommend DeluxePaint because the tools are easier to use.

I also recommend designing your palette in advance. To save memory and disk space, leave the background color in the first palette position and the line color in the second. If you have

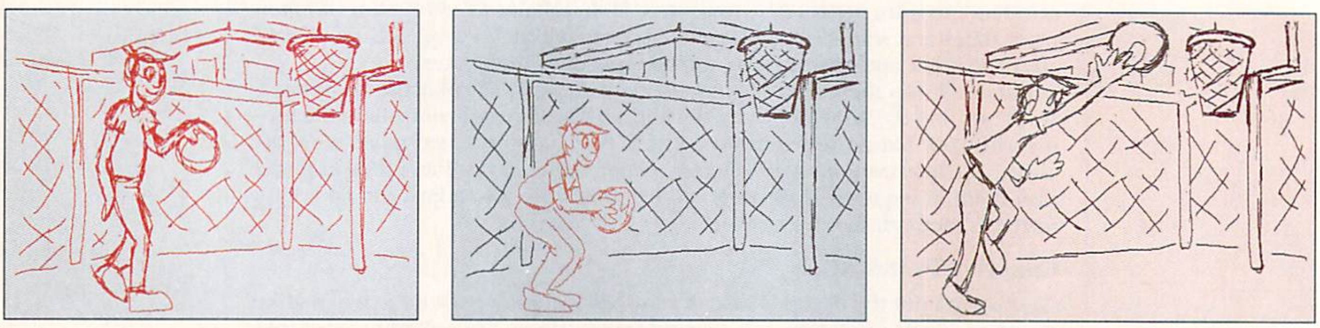


Figure 1. Above are three panels in a "storyboard" that's designed to sketch out broad phases of the animation of the finished character in the opening illustration of this article.

ever filled areas with color, you know that it spills out all the time. If you draw your animation with a brush that is bigger than a single pixel, you see the breaks in the lines more easily. When the color does spill out, it is a little faster to clean up the break with the fill color instead of the line color—after all, it is such a small space no one would ever see it. Just toggle the d and f keys in DeluxePaint for drawing and filling.

Just as in traditional cel animation, it is more efficient to finish one color on all the frames before you move on to the next. If you must fill a really complex drawing, such as a heavily wrinkled face or a zebra, you may find it easier to draw a filled shape under the lines. Here's the technique: Turn on Stencil (Effect/Stencil/Make), click on the background, and then click on Invert and Make. This procedure locks all colors except for the background.

Now select the filled-drawing tool by pressing the shifted d key and draw a blob completely enclosing the sketch. If the outer edge of your image is solid, you can fill the outer edge of the blob with the right mouse button.

If any part of your animation repeats its movement, be sure to use the animbrush. If you want to create a crowd scene, for example, you could animate and color one member of the crowd, then pick up that character as an animbrush.

To simulate depth in the scene, shrink the animbrush with Perspective—use either Effect/Perspective/Do, or press the keypad's Enter key, followed by the apostrophe key—so that the people in the far background appear small. As you add characters to the foreground, press the semicolon key to make the people bigger. You should offset the motion by starting the animbrushes on different frames. After all, you do not want them to move in unison like Rockettes—unless, of course, you are animating Rockettes!

You can even change the timing of each animbrush by altering the value of the duration. If you put a number in the count that is lower than the number of cels in your animbrush, the motion runs faster. If the number in the count is higher, the motion is slower. The slower the motion, the jerkier it looks, because some drawings are held for more than one frame. In a crowd scene, though, the slow speed may not be that noticeable.

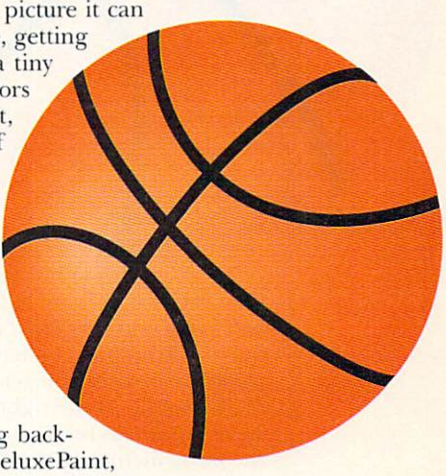
Time To Merge

If your background painting is static and uses the same palette as your animation, the next process is simple. Press the j key to jump to your spare screen and load your painting. Now press the j key again to come back to your animation and merge behind all frames (Picture/Spare/Merge in Back). When you are clearing a frame or merging with a spare page in DeluxePaint, and you see a requester that asks you to choose which frames (Current, Range, or All), always select Current Frame first. If the background successfully goes behind the drawing on your current frame, do it for all frames. If it does not work, you can undo the mistake.

What if your palettes do not match? In that case, you can load the background painting, restore the palette, and remap the painting. This process makes the background use the colors from the animation, but these shades probably are not the right colors for a nice-looking background.

Instead, save your animation and some representative brushes from your animation in color. Choose Screen format and switch to HAM. (I do not really recommend HAM for most professional applications, because the fringing makes it not quite sharp enough. But in the right circumstances—such as this application in which we use HAM only to help optimize the palette—it can look beautiful.) Load the background, then load and remap all brushes and paste them anywhere on screen—as long as you do not obscure important colors. You can resize and crop them, but remember that this is just for building a palette.

Now that you have a badly composed frame with all the colors from your animation, save the picture, go back to Screen format, and choose 32 colors. DeluxePaint tries to make the best picture it can using your colors. Of course, getting a perfect picture with just a tiny fraction of the number of colors you started with is difficult, but it's worth it—trust me. If you want a more elegant HAM-to-32 conversion, you could use either ***Progressive Peripherals*' PIXmate** ($69.95) or ***ASDG*'s Art Department Professional** ($240).



All Types of Backgrounds

What if you want a panning background? If you have used DeluxePaint, you know that you cannot animate with a page bigger than the screen. But you can make a spare screen that is larger than the animation screen. Hit the j key; then choose Page Size from the Picture menu and type the size of a larger screen.

To make a horizontal pan on a 320x200 screen, type ►

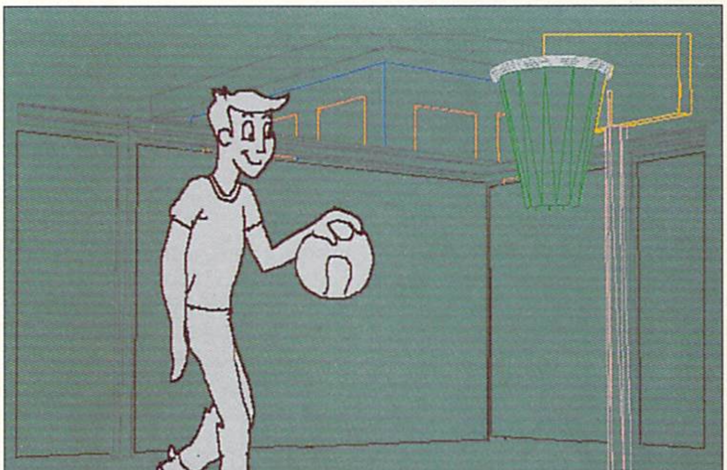
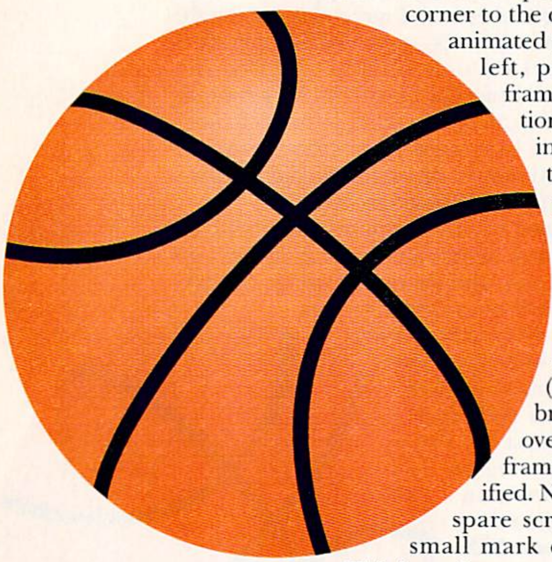


Figure 2. In the "layout" stage, a tighter representation of each scene is created for more precise planning. Notice that the layout is much closer in appearance to the finished scene in the opening illustration than is the corresponding storyboard panel in Figure 1.

640 as the horizontal size, click OK, and do not stretch the picture. To paint the picture, scroll left to right by pressing the cursor keys, then pick up a brush of it one screen at a time—pick it up from one corner to the other. To make an animated pan from right to left, paste it down on frame 1 of the animation screen. Positioning it is made a little easier if you put the brush handle on the corner (ALT-X).



Now go to the Move menu. To reposition the x-axis, type 320 (the width of the brush) and move it over the number of frames you have specified. Now go back to the spare screen and draw a small mark on its far right. (This is to show you where to pick up the next brush.) Scroll left until the mark is on the left-hand side of the screen. Now pick up a brush as far as, but not including, the mark. Press the j key to get back to the animation screen and back to frame 1, put the brush handle on the right-hand side of the brush, and paste it down as far to the right as you can. Go back to the Move menu and repeat the same procedure. If you have done this technique correctly, the two brush halves should match up perfectly.

If your project demands a more detailed background, you may want to paint or render a 24-bit (16 million colors) background picture and composite your animation drawings over the top. NewTek's Video Toaster, ***Digital Creations***' **DCTV** ($495), ***Centaur***'s **ColorBurst** ($699), and ***Impulse***'s **Firecracker 24** ($995) include paint programs that can combine images of disparate resolutions and also allow you to paint. This capability is handy if you want Roger Rabbit-style soft shading, but you can work on only one frame at a time. AD Pro has a 24-bit composite provision, but no paint features.

Sound Advice

When it comes time to create your sound track, do not forget your Amiga's capabilities. (If you are including dialogue, record it before you draw your graphics so that you can make your animation mouth the words.) Recording the track directly on your Amiga is possible. ***SunRize Industries***' **Studio 16/AD1012** ($495) is capable of high-quality sound digitizing.

More conventional production uses quarter-inch audio tape to record the sound. With professional recording equipment, it is possible to put a sync track on the tape to guarantee that the speed does not waver. If you have a low budget, though, a hi-fi VCR is a good option. It records a high-quality audio track at a much more consistent speed than most audio-cassette machines. My best advice is to put a sync tone (this need be no more than you saying "beep" into the microphone) at the beginning of your recording. It is a useful signal as to when to start playing your animation.

You can sample the audio with any audio digitizer such as ***SunRize***'s **Perfect Sound 3.0** ($99.95). The quality need only be good enough to get accurate timing, because for the finished production you need to go back to your tape. Once you have a soundtrack sampled, you should make an exposure sheet that shows you what sounds happen at which frames.

I have used ***Hash Enterprises***' **Animation:SoundTrack** ($119.95) and ***MicroIllusions***' **Photon Cel Animator** ($49.95)to create an exposure sheet, but both programs have little quirks that make them unpredictable. The most effective way to document the track is to write the information on a piece of paper—preferably with a description of the sound marked frame by frame, with the frame numbers starting at the top of the page and running down it.

Often the sound descriptions are on the left, the frame numbers run down the center of the page, and a description of the action is on the right. This setup is more or less an animation-studio standard. Cel Animator actually has the capability of taking the information you write into the program and printing it in x-sheet style.

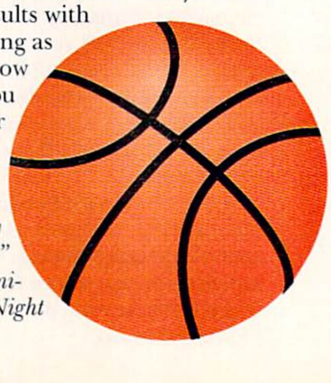
And...Action!

The final step is to get your animation on tape or film. If you have one short scene, you should be able to use a video encoder or a genlock such as ***Digital Creations***' **SuperGen** ($799) to get it on tape in real time. If your animation is longer, you could record each scene, then edit them together in a video-editing suite. Your VCR may yield good enough results, but getting frame-accurate edits from even the best consumer VCR is difficult, because it does not time-code the frames. (See "Frames of Reference," p. 27, for more on time code.)

Using film is at once simpler and more complicated. You just aim an animation camera with a slow shutter speed at the monitor and record the frames one at a time. (Try to do this in a darkened room.) The complicated part about this process is that you should do exposure and position tests and get the test film processed before you film your project.

If you want higher resolution, you can use a single-frame camera to shoot an image on a framebuffer like Firecracker 24 or ColorBurst, or you can single-frame record onto videotape from the Video Toaster, DCTV, or any framebuffer. For the best quality, though, rent time on a film recorder that takes a 24-bit image and records it directly to film.

Most cartoon animation does not require the high resolution and number of colors that live action needs. In fact, as I have tried to demonstrate here, you can get professional-looking results with the simplest of means—as long as you have your Amiga. Now aren't you wondering why you didn't become an animator sooner? ■



Steve Segal originally became famous in the Amiga community for his "Dance of the Stumblers" animation. He has also done animations for ABC's "Into the Night With Rick Dees."

Walking in Cycles

Don't be discouraged by the challenge of animated walking. Build yourself a training wheel and then just ride the walk cycle.

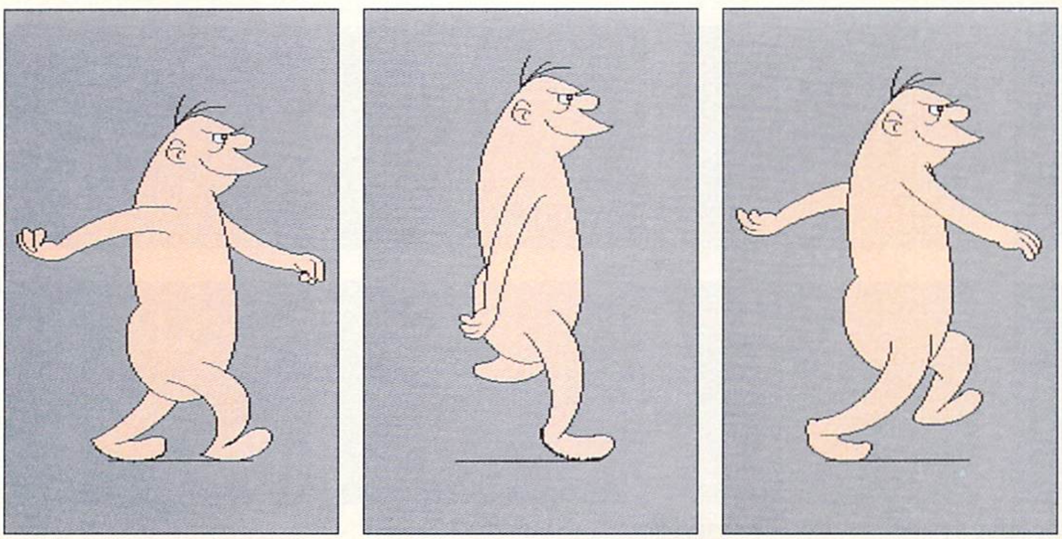
By Gene Hamm

Put one foot in front of the other, and you will create a pretty clunky walk. Making a character walk convincingly is one of the hardest tasks an animator faces; in fact, many veterans still find it their greatest challenge.

For drawing walks, both professionals and students refer to two main source books. For absolute realism, the major reference is Edward Muybridge's *The Human Figure in Motion*, published by Dover; for cartoons, it is *Animation*, by Preston Blair, published by Walter Foster.

Although these volumes are excellent (the cartoons seen on Saturday morning television bear witness to the walks in these books), the walk cycles in both are laid out in sequence. It would be easier to understand the evolving pattern that constitutes a walk if the individual frames were superimposed over one another. The walk "cycle" would then be apparent, because in walking, the feet appear to be pedaling an invisible unicycle.

In cell animation, the term "walk cycle" refers to a series of drawings in which a character walks in place, as if on a treadmill. The last drawing hooks up to the first, so when the drawings are repeated, they flow smoothly into one another. Walk cycles save work. If it takes 144 drawings for a character to walk from screen left to screen right, you can create a 12-frame cycle and repeat it 12 times.



Your Amiga can help you achieve convincing walk cycles. Keeping in mind the concept of the unicycle, you can easily create a walking guide using your favorite Amiga paint program. To illustrate the process, I will use the popular DeluxePaint IV from Electronic Arts.

Training Wheels

In DeluxePaint IV, call up the Symmetry requester and click on Point and Mirror. In the Order Box, type in 12 (a traditional cell-animated walk cycle is ►

16 frames long, but for simplicity, we will make ours 12) and click on OK. Tap the plus (+) key once to make the line one size thicker. Pick a light-blue color to draw the wheel with; it will be stenciled out when you finish the animation. At the Preferences menu, turn on the coordinates. Begin a straight line at 1r and 0 degrees (at the exact center of the screen) and move right to 40r and 0 degrees. The Symmetry tool will draw 12 lines, giving you what looks like a 12-point asterisk. These lines are the spokes of your wheel.

Now turn off the Symmetry tool. Click on the Circle tool and place the cursor over the center of the spokes. Next press the m key to enter Magnify mode, and then place the cross hairs of the Circle tool over the center point of the spokes and click the left mouse button. Press the m key again to get out of Magnify mode. Make your circle the same diameter as the asterisk and click again to anchor the circle. Save your wheel as a brush. Press the period (.) key to free your cursor of the brush after it is saved.

Now draw a side view of a character's body facing right, without arms or legs, about 80 pixels high. Save it as a brush and clear the screen. In the Animation menu, choose Frame and set it for 12. Flip to the j screen. From the Brush menu, load your body brush and click it down to the center of the screen, making sure to leave plenty of room to animate the legs. The body will serve as a registration point to make sure the legs fit on the hips.

Next, load up the wheel brush. Most walk patterns are variations of ovals (people do not raise their knees high enough to reach the top of a circle unless they are leading a parade), so we will squash our wheel down a bit. Press the x key to double the width of the brush, then hit the h key to halve its height. Now paste the wheel approximately 20 pixels below the body.

From the Picture menu, choose Spare, followed by Copy to Spare; then swap screens so that you are back at frame 1. Erase the body, leaving only the wheels, and go to the Animation menu. Choose Frames, Copy Frames, and finally Current Frame to All Frames.

Clock the Walk

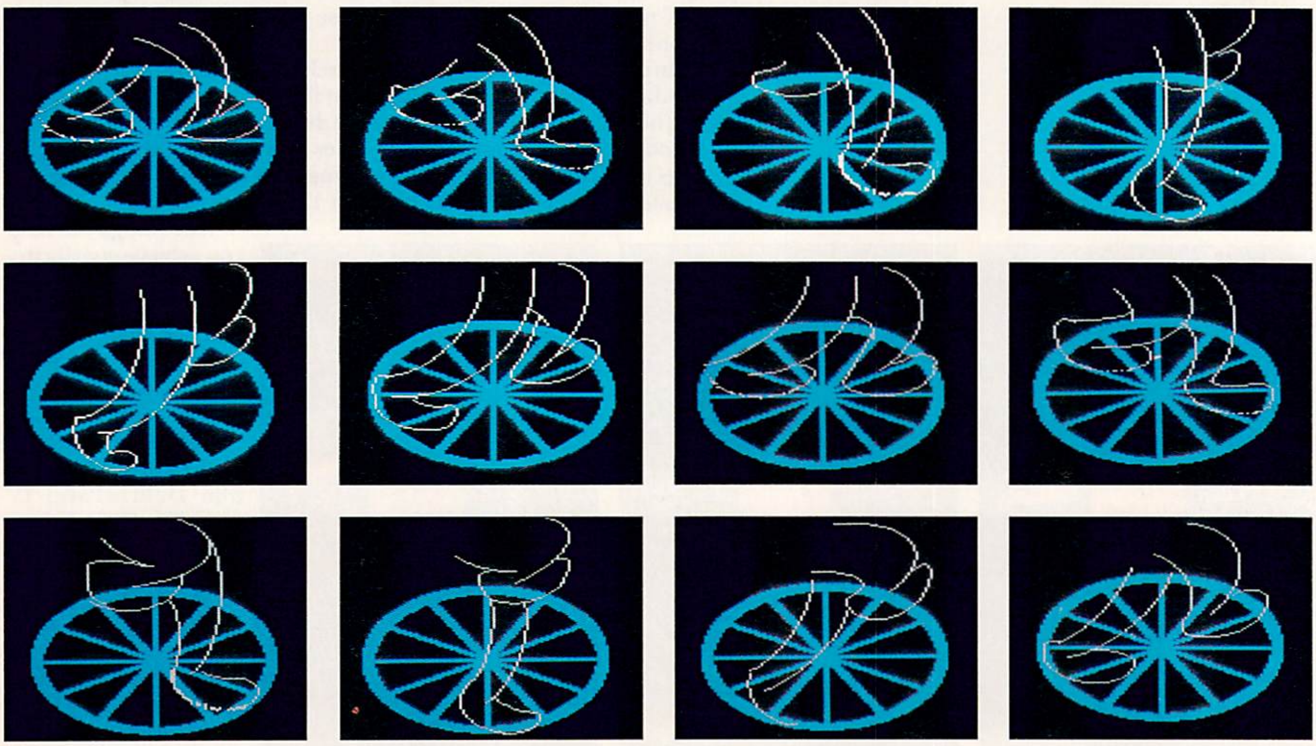
It is now time to draw the legs. To make it easier to later add the body with a stencil, draw the right leg in black outline and the left in red.

You have probably noticed that, with its 12 spokes, the wheel resembles a clock. With that in mind, draw the right foot at three o'clock and the left foot at nine o'clock for the first frame. In the second frame, put the right foot at four o'clock and the left at ten o'clock. Continue moving clockwise one position every frame until the cycle is complete. Make sure as you do so that the toe of the forward foot and the heel of the back foot always touch where the spoke meets the rim of the wheel.

Here is where each foot should be placed in each frame to make a complete cycle:

Frame 1. Right foot at three o'clock, left foot at nine.
Frame 2. Right foot at four o'clock, left foot at ten.
Frame 3. Right foot at five o'clock, left foot at eleven.
Frame 4. Right foot at six o'clock, left foot at twelve.
Frame 5. Right foot at seven o'clock, left foot at one.
Frame 6. Right foot at eight o'clock, left foot at two.
Frame 7. Right foot at nine o'clock, left foot at three.
Frame 8 Right foot at ten o'clock, left foot at four.
Frame 9. Right foot at eleven o'clock, left foot at five.
Frame 10. Right foot at twelve o'clock, left foot at six.
Frame 11. Right foot at one o'clock, left foot at seven.
Frame 12. Right foot at two o'clock, left foot at eight.

In each frame, the position of the feet rotate but the hip position remains constant, so that the legs bend ac-



Walk around the clock by keeping the right and left feet at opposite sides of the dial.

cording to the distance between the hips and feet. Make sure you do not outline the top of the right leg in black, as it will need to overlap the body. Instead, close it off with a flesh tone.

It is now time to get rid of your training wheel. Call up the Stencil requester from the Effects menu (or press ~) and find the light-blue color you used to draw the wheel. Click on the Invert box and then click on Make. Pick out the background color for your brush, click on the Filled Rectangle tool, and erase the wheel in every frame, leaving just the legs.

Run through the frames again, this time filling each right leg with the flesh tone. When you are finished, color the left leg yellow in each frame.

Now we will attach the body to the legs. Load the body brush and turn on the grid to make registration a little easier. Once again, call up the Stencil requester. Clear out your old stencil, pick out black and the flesh tone, and select Make to activate the stencil. Plant the body so that the right leg is on top of the body, and the left leg is behind it, making sure that the body is at the same coordinates in every frame. Clear the stencil, pick red, and click on Invert and Make. Pick black and turn the red outline of the left leg to a black outline.

Place the cursor over the flesh tone on the right leg and press the single close quote (') key. When the cursor changes to an eyedropper, click the left mouse button to pick up the flesh tone. Now turn all the legs that are colored yellow to flesh color using the Fill tool. In the Animation menu, save the frames completed up to this point as an ANIM file.

Get That Swing

For balance, the arms move in the opposite direction to the legs. When the right leg is all the way forward, the right arm is all the way back, and vice versa. To make a grid for the swing of your character's arms, clear the 12 frames and use the right mouse button to turn on the Symmetry tool.

For the legs, you set the number in the requester at 12; this time set it for 13 (it sounds wrong, but it works). From the center point of the first frame, draw a straight, light-blue line 40 pixels to the right. After creating the 13-spoke asterisk, click on the Rectangle tool and use the right mouse button to erase the top half of the asterisk. That should leave you with 12 lines branching down from the center point similar to a pendulum path. Number the lines 1 through 12 from left to right, and save this grid as a brush for the arms.

Clear the first frame, load the arm-grid brush, and copy it to all the frames, just as you did for the leg grid. Now draw the arms—the right in black and the left in red—over the arm grid. Line by line, the arm cycle should go as follows:

Frame 1.	Right arm/line 1,	Left arm/line 12
Frame 2.	Right arm/line 2,	Left arm/line 11
Frame 3.	Right arm/line 3,	Left arm/line 10
Frame 4.	Right arm/line 4,	Left arm/line 9
Frame 5.	Right arm/line 5,	Left arm/line 8
Frame 6.	Right arm/line 6,	Left arm/line 7
Frame 7.	Right arm/line 7,	Left arm/line 6
Frame 8.	Right arm/line 8,	Left arm/line 5
Frame 9.	Right arm/line 9,	Left arm/line 4
Frame 10.	Right arm/line 10,	Left arm/line 3
Frame 11.	Right arm/line 11,	Left arm/line 2
Frame 12.	Right arm/line 12,	Left arm/line 1

Stencil out the grid as you did before, color the arms the same way you did the legs (right arm flesh tone, left arm yellow), and save the arm swing as an animbrush. Next, clear all the frames, turn on the Grid tool, and load the body-with-legs animbrush. Step through the frames, planting brush 1 on frame 1, brush 2 on frame 2, and so on, until the cycle is complete.

Load the arms animbrush, set the stencil for black and flesh tone, and register arm brush 1 to body 1, and so on, until each body frame has its respective arms. With the moving arms and legs attached, save the complete body as an animbrush.

Clear all the frames again and press the period (.) key to free your cursor. Draw a straight blue line where you want the character's feet to walk and copy it to all the frames.

Load your animbrush and lay down brush 1 on frame 1 so that the feet touch the line. On the next frame, making sure the body does not shift left or right, lay down the brush so the lowest foot touches the ground. Do that on every frame until the cycle is complete.

Now play it back and watch the character's body bob up and down as he walks. Finally, stencil out the straight blue line and save the walk as an animbrush. With the Move requester, the character can now walk across the screen.

Walk This Way

To vary the walk, you can expand, reduce, squash, or stretch the grid. To slow down the walk, make grids with 16 lines, 24 lines, or more. To create a running character, make grids of six or eight lines. No matter how many lines you have, remember always to position the feet at opposite ends of a line.

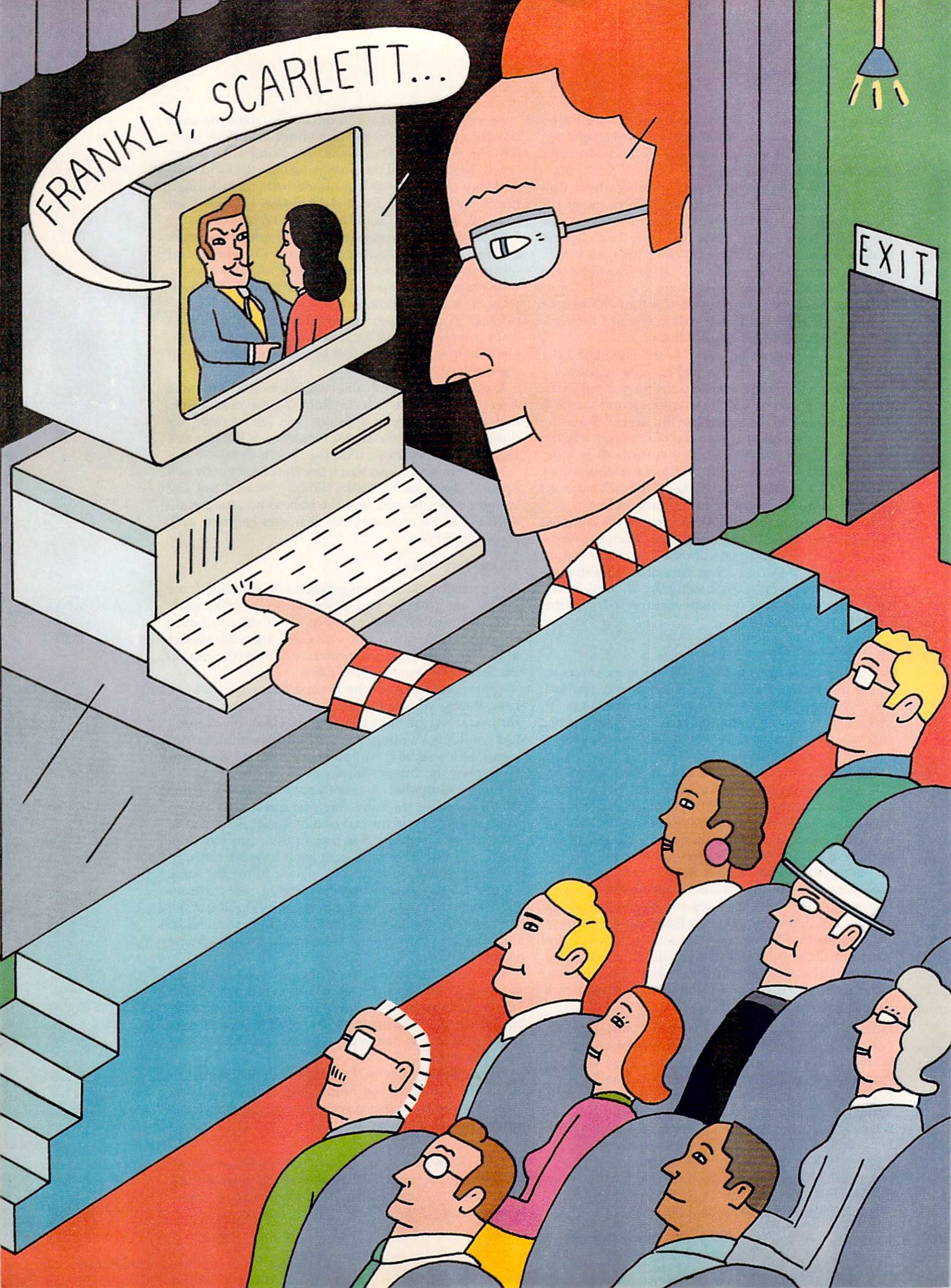
Also remember that the faster a character walks or runs, the more its body leans forward. In lightning-fast cartoon runs, the body can be horizontal. If you don't feel confident drawing a body leaning at different angles, take a vertical body and lean it by using the Shear tool under the Brush menu.

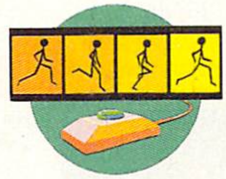
The training wheel concept also works for characters that have more than two legs. To create four-legged walks, use a bicycle instead of a unicycle. For balance, the back set of legs moves in the opposite direction from the front set, so if the back right leg is forward, the front right leg is back, and vice versa. You can use the same animbrush for the front and the back legs: For the front legs, lay down the animbrush from the beginning of the cycle, and for the back legs, lay it down from the middle. (You can step through the animbrush frame by frame using the 8 key.)

In a six-legged walk, the front legs start at the beginning of the cycle, the middle legs start in the middle, and the back legs, echoing the front, start from the beginning. By remembering that each set of legs does the opposite, you can even animate a centipede with one animbrush.

Although the wheel will help you with the mechanics of a walk, it is up to you to give that walk personality. Now that you know the basics, put your animated character through its paces! ■

Gene Hamm is a veteran animator who works for Colossal Pictures. His past credits include work on The Gumby Show. Write to him c/o AmigaWorld *Editorial, 80 Elm St., Peterborough, NH 03458.*


FRANKLY, SCARLETT...
EXIT



Amiga "TALKIES"

Syncing Sound with Animation

Like the dramatic shift in film technology from silent movies to sound, using your Amiga to synchronize your sound track and animation is a pioneering breakthrough. Here's a tutorial on successful syncing techniques—with special emphasis devoted to two presentation programs, AmigaVision and DeluxeVideo III.

By Gene Brawn

Silent movies—the phrase inevitably conjures up visions of a rickety old theater where a solitary piano player bangs out popular tunes that only occasionally match the on-screen action. In reality, "silent" films were rarely silent. Most feature films of that era came complete with elaborate musical scores timed to the scenes in the film. In big-city theaters, actors positioned behind the screen supplied limited dialogue, realistic gunshots, screams, and animal hoofbeats. The musician, more often than not, sat at an organ that was studded with hundreds of built-in sound effects. Obviously, the pioneers of cinema knew that the skillful use of sound and music was essential to the success of their films.

Today, computer animation is entering its own "sound age." Full-motion video is waiting in the wings, and with it, the synchronized digital sound track. Disney-style squashes and stretches may be the epitome of traditional animation, but there is no more demanding task for your Amiga (or any other computer) than the synchronization of real-time digital audio and video.

Can you truly synchronize a voice and the digital image depicting that voice on an Amiga? The answer is yes: With the proper software, a few pieces of hardware, and tricks from this tutorial, you can have your machine literally singing in a matter of hours.

The Shopping List

Creating stereophonic, synchronized animations requires a lot of computing power and sophisticated tools—both of which your Amiga has plenty. To complete this tutorial, you will need the following: a framegrabber and an audio digitizer to capture the original video signal; paint, animation, and sound-editing software to massage the signal; and a software package to "glue" all the pieces together.

Digi-View Gold 4.0 (*NewTek*, $199.95), **FrameGrabber** (***Progressive Peripherals***, $499.95), **DCTV** (***Digital Creations***, $495), or the **Video Toaster** (*NewTek*, $2495) with a time-base corrector are all capable of capturing your finely crafted video frames. Use ***Electronic Arts*** **DeluxePaint IV** ($179.95), ***Oxxi***'s **SpectraColor** ($99.95), ***Progressive Peripherals*** **Animation Station** ($49.95), or ***HoloSoft***'s **Graphics Workshop** ($100) to touch up, modify, and edit the animated frames. ►

ILLUSTRATED BY STEPHEN TURK

The accompanying audio track is easily digitized with any of the sound samplers available for the Amiga, including *Oxxi*'s **AudioMaster IV** ($99.95), *SunRize*'s



Figure 1. AmigaVision's Flow window, with Event icons used to build a flowchart of your presentation.

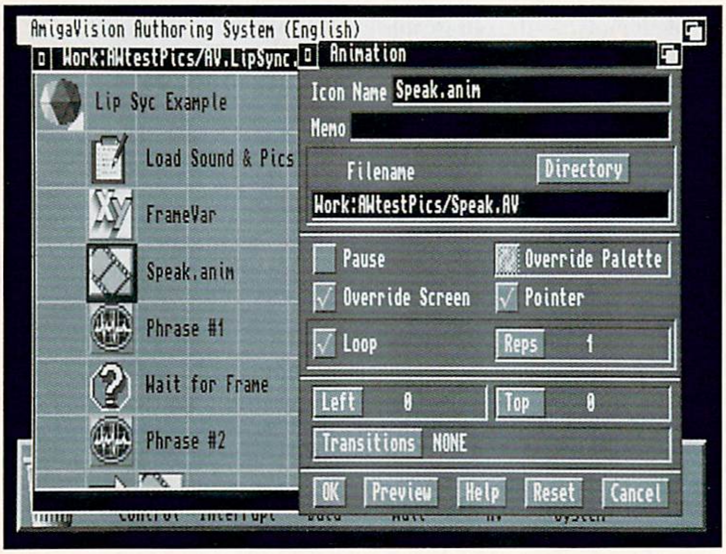


Figure 2. Double-clicking on an Event icon brings up the corresponding file requester on the right.

Perfect Sound 3.0 ($99.95), or *Microdeal*'s **AMAS** ($199.95). Sample-editing software—*Oxxi*'s **Aegis AudioMaster III** ($99.95), *SunRize*'s **Audition 4** ($99.95), and *GVP*'s **Digital Sound Studio** ($125), for example—lets you mold and shape your sound effects any way you choose.

A musical sound track, essential to many productions, is easily created with one of the Amiga's numerous SMUS (Simple Music Score) programs: *Blue Ribbon SoundWorks*' **Bars-&Pipes** ($199), *Oxxi*'s **Aegis Sonix**($79.95), and *Electronic Arts*' **Deluxe Music Construction Set** ($99.95) provide the power of a computerized secretary to assist you in creating musical scores.

Finally, you can put all the pieces together with the help of *Commodore*'s **AmigaVision** ($149.95), *Right Answers*' **The Director Version 2** ($129.95), *Gold Disk*'s **ShowMaker** ($395), *Electronic Arts*' **Deluxe-Video III** ($99.95), *INOVAtronics*' **CanDo** 1.5 ($149.95), or *Walt Disney Computer Software*'s **Disney Animation Studio** ($129).

Other useful programs include *MicroIllusion*'s **Photon Video Cel Animator** ($69.95), which breaks an animation's sound sample into synchronized, frame-sized chunks, and *Hash Enterprises*' **Animation: Soundtrack** ($119.95), which adds sync-sound capability to the company's modular animation product line. And for novices to this arena, *Gold Disk*'s **MovieSetter** ($69.95) is easy to use.

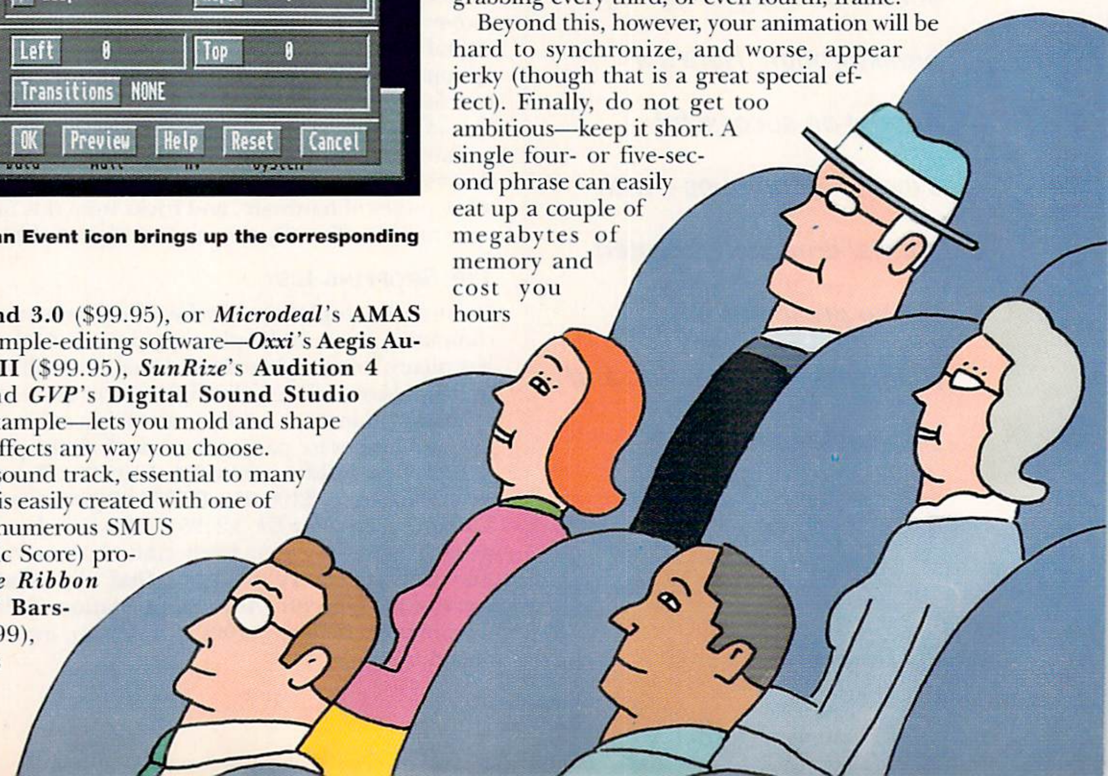
Preliminary Guidelines

Although this article is not meant to cover the sound- and video-digitizing processes, there are a few things to consider. First, do not imagine that you will be able to achieve full-screen, full-motion video without huge sums of memory and the fastest of processors (and perhaps not even then). Instead, confine the size of your image to a quarter, or less, of the screen. This will not only conserve memory (for more frames), but also give the processor a chance to keep up with the frame rate.

Second, use low resolutions whenever possible. Because these are moving images, you do not need the detail or sharpness demanded of a still picture. Third, do not grab every frame of the video sequence. Although the Amiga can reproduce an audio track in real time, it cannot do the same with digital video.

Realistically, a display rate of 15 frames per second is possible for a digitized, quarter-screen image. A typical NTSC (National Television Standards Committee) video runs at 30 frames per second, so you can display only every other frame if you hope to keep up with the audio. Take this a step further and create longer sequences by grabbing every third, or even fourth, frame.

Beyond this, however, your animation will be hard to synchronize, and worse, appear jerky (though that is a great special effect). Finally, do not get too ambitious—keep it short. A single four- or five-second phrase can easily eat up a couple of megabytes of memory and cost you hours



of frustration when you are trying to synchronize sound and video.

THE DEFINITIVE DUO

Once you have created the digital ANIM and its associated, but still separate, sound file, you are ready to tackle the synchronization process. To illustrate a few of the many ways you can accomplish your goal, I have chosen two of the most frequently used presentation programs. I begin with Commodore's AmigaVision, a solid program that benefits from its powerful and intuitive interface, which is similar to a programmer's flowchart.

My second package is Electronic Arts' DeluxeVideo III: Although not blazingly fast, its timeline-based interface makes it ideal for sound-synchronization tasks. You may not own either of these titles, but the problems and solutions I present here are so typical that they will fit almost any of the many applications programs on the market for the Amiga.

The same task is required of each of these two programs: to synchronize a short voice sample to the equivalent number of frames of digitized video. This is the most difficult task one can ask of a computer animation program, because the human eye is so sensitive to inconsistencies between facial muscles and speech. If you can create a successful "lip-sync" animation, any other task, such as adding a sound effect or musical track, will be a snap.

WORKING WITH AMIGAVISION

If you have ever designed a program, then AmigaVision's interface should be familiar. The AmigaVision developer stacks icons, representing the program's events, to build a graphical flowchart of the presentation (see Figure 1). Although this method certainly facilitates rapid program development, it is not as easy to use when you are dealing with time-specific events such as speech synchronization.

Your first step is to open AmigaVision, drag a Resource icon from the System menu onto the workspace, and position it below the Module symbol. Because the sound and animation files must be ready to play at the same time, you need to load both before you run the sequence—this is the function of the Resource tool. Double-click on the Resource icon to bring up its Information requester. Click on the Directory gadget to display a list of your files, then double-click on the file you wish to load; click on OK to close this window. Finally, click on Insert to add the file to your list. Do this for both the sound and ANIM files.

Next, position an Animation icon from the AmigaVision menu below the Resource icon (see Figure 2). As in the previous item, choose the file by clicking on the Directory gadget. Next, click the Loop button to select this feature, and then set Reps (repetitions) to 1.

Be certain that the Pause feature is turned off. If it is selected (on), the program waits until the animation is finished playing before it moves on to the sound file. (Pay particular attention to this tool—Pause is one of AmigaVision's most powerful features. For example, disabling Pause and then loading an animation causes the sequence to begin playing before it has completed loading, a handy trick in tight memory situations.)

Click on OK to close up the window and return to the AmigaVision menu. Drag a new Sound Event icon below the Animation icon. Set it up just as you did before; here, however, it is fine to leave the Pause feature on, as this is the last event in the list.

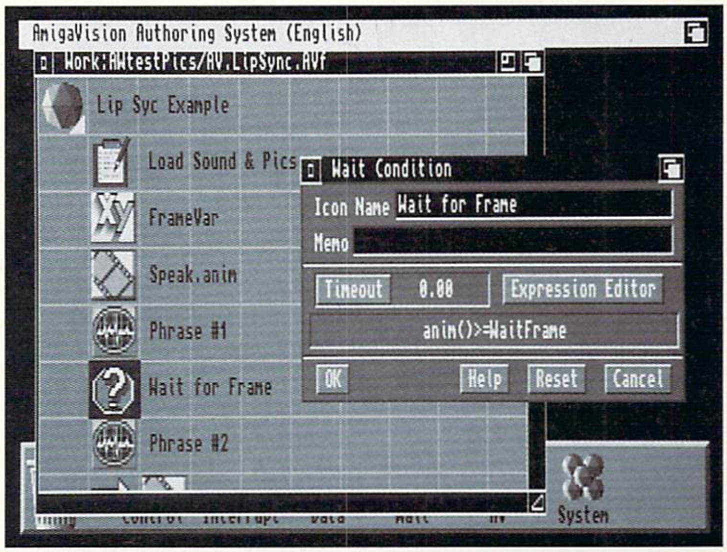


Figure 3. Here, double-clicking on the Wait for Frame icon brings up the Wait Condition requester. Next...



Figure 4. ...Click on the Expression gadget to bring up the Expression editor to create new variables.

Now test your handiwork by selecting Present from the title bar's Project menu.

IF AT FIRST YOU DON'T SUCCEED...

The chances are that your test did not work. Usually, the sound begins at the wrong time, or the animation takes too long to play, or something else goes awry. Even though you kept the test simple, making sure the video and audio started at the same time, the two ended up out of step. What probably happened is that you missed a frame or two while capturing the video. The obvious solution is to slow down the animation to match the audio track; however, you cannot do this with AmigaVision. The program simply, but inconti- ►

nently, uses the speed information contained in every ANIM file. To change the playback rate of an animation, you have to return to the program that created it.

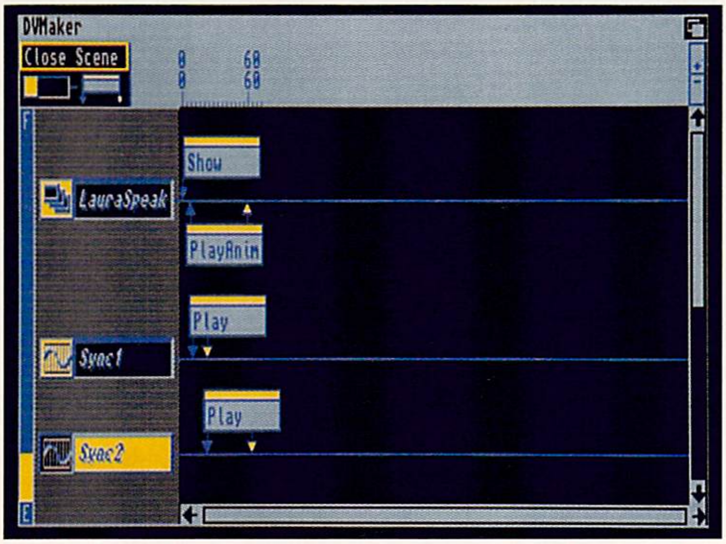


Figure 5. Unlike AmigaVision, DeluxeVideo III employs a horizontal orientation for organizing Event icons via its timeline.

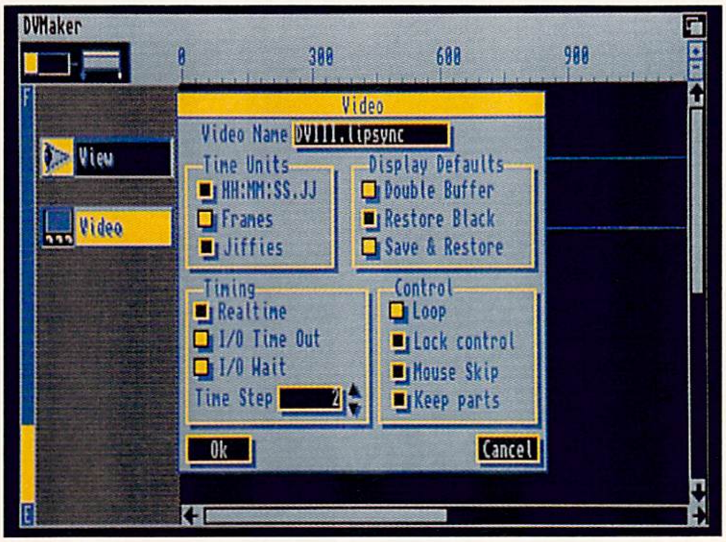


Figure 6. Double-clicking on DVideo's Video track brings up the corresponding requester for selecting settings for your presentation.

I know what you are thinking—just play the sound faster, right? Sorry, but you will be better off using your sound editor instead. If you have enough memory, run AmigaVision and your sound or animation editor simultaneously while you make the necessary adjustments. If the timing error is very small, simply changing the order of the Sound and Animation events may delay the start of the video long enough to correct the problem.

Very often, you need to delay the sound until you are well into the animation. In this case, you want AmigaVision to signal you when that particular Animation frame is ready. Synchronizing sound to a specific frame is, thankfully, simple when using AmigaVision's Condition(al) Delay from the Wait menu (see Figure 3). Select and double-click on Condition Delay. When the requester appears, click on the Expression gadget, which brings up the Expression editor (see Figure 4). From the Functions list, select the anim() item. Type "=" followed by "WaitFrame," and you will have just named a new variable; its name now appears in the Variables box.

Although AmigaVision knows the name of your variable, that variable does not yet exist. To create WaitFrame, grab the Variable icon from the Data menu and drop it on the Animation icon that is already in the flowchart. The stack rearranges itself with the new icon inserted above the Animation icon. Open Variable and click on Insert to start the Expression editor (see Figure 4 again). In the Variables window, you will see WaitFrame just where you left it; click on it. In the Text box, enter "=" and then the number of the frame where you want the sound to begin.

Do not go anywhere yet, however, because that frame number is really the number of frames that have elapsed since the beginning of the animation (at 30 frames per second). To calculate the proper AmigaVision frame number, divide 30 (frames per second) by the playback rate of your animation and multiply the result by the frame number of the animation.

Unfortunately, this did not work for me: The first word of the sentence refused to sync up, although the rest of the phrase was perfect. If this happens to you, follow my lead—I fired up my sound editor and loaded the voice sample. The solution, thank goodness, was simple: Find a natural pause within the phrase, divide the sample into two parts, and save both. Then you can isolate the problem word and delay the rest of the sentence until the correct frame appears. Return to AmigaVision and replace the old Sound icon with the two new samples. Insert a Condition event in each with the variable set to your newly calculated sync-sound frame numbers.

Working with DeluxeVideo III

DeluxeVideo III, while as easy to use as AmigaVision, presents a very different working environment to the multimedia designer (see Figure 5). Instead of AmigaVision's vertical orientation, DeluxeVideo organizes its events on a horizontal timeline. For example, if you place a Sound Event icon on the timeline at 0:01.00, that sound will be played exactly one second into the presentation. This makes it very easy to synchronize video and sound, because all you have to do is drag icons back and forth on the timeline until you get it correct.

For even finer control, DeluxeVideo also allows you to adjust both sound and video playback rates. Start building your sequence by firing up DeluxeVideo and double-clicking on the Video track. A requester appears with the default settings for this presentation (see Figure 6). Be sure to highlight Double Buffer, Save & Restore, I/O Time Out, and I/O Wait. Choose ►



AMIGA PROFILE

KEEPING DISNEY ANIMATED

A SELF-STYLED Amiga crusader, *Kelly Day* is one of those people who will go through hell, high water, and corporate bureaucracy to get Amigas into key, high-profile settings. Day's particular challenge, however, was tougher than most: to get the Amiga accepted by Walt Disney Television animators, a demanding and immensely respected group of professionals.

Day has always had the "computer bug." He began by helping to develop game software for the eventually discontinued Atari 1200 and 800 computers. Despite his enthusiasm, Day soon realized that it took an astute programmer to produce good graphics, and most of his background was in art.

For Day, that was reason enough for a career change. Soon he found himself at DIC, the company that produces (using, at that time, traditional techniques) about 80 percent of the Saturday morning cartoons.

When the Amiga 1000 arrived on the market, Day rushed out to buy one and spent the next five years "desperately trying to convince animation firms that they should look at it." In Day's mind, using computers such as the Amiga could allow animation firms, which have most of their frames drawn overseas, to bring everything back in house. "We do only animation design and [so we] lose control," Day argues.

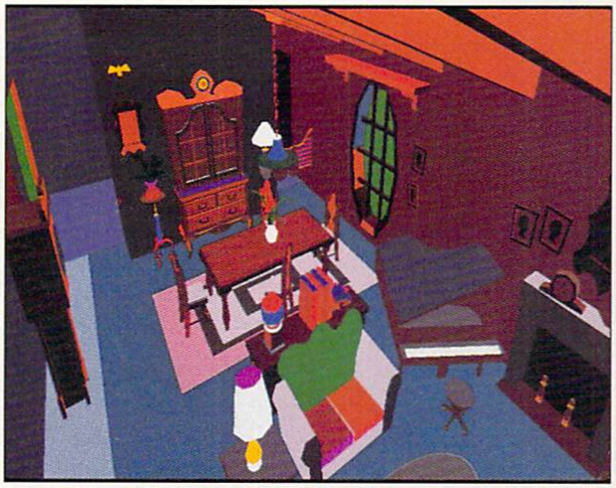
Unfortunately, his ideas were ignored. So when Day landed a job at Walt Disney TV, he tried to keep his mouth shut about the Amiga—that lasted all of three months. In early 1990, Day broke down, brought in his own Amiga 2500, and then snuck in a few Amiga scenes for a Disney movie called *Duck Tales*.

His current project for Disney is *Goof Troop*, a television series about Goofy's home life. Goofy has a neighbor, Pete, who always tries to outdo him by getting the latest and greatest objects on the market. All those objects—such as houses, cars, and boats—are built by Day on his Amiga.

Day's techniques are a real change of pace for most Amiga animators. "All the hi-res stuff is beyond what you need for animation. What you need are flat areas of color with outlines." This sounds simpler than it is, because those outlines cannot have the choppy look so common to computer animation.

Day uses both Byte by Byte's Sculpt Animate 4-D and Impulse's Imagine to create 3-D models that are rendered with flat areas of color. He adds no shading, dithering, or antialiasing. He then employs Gold Disk's Professional Draw to trace the object, which creates an outline that appears as if it were done by hand. The drawings are then copied onto cels and hand-painted. Eventually, Day hopes to go straight to color printing.

According to Day, however, the Amiga is still not at a point of being able to output color-printed frames to produce a final animation. "Even our sophisticated tools cannot animate a character with the realism that Disney demands," he says. Tweening, or having the computer generate frames in between specified points of motion, is just too smooth. The result looks unnatural. "It is too time-consuming to get too life-like. We do a show a week," Day explains. As a result, backgrounds and props are the elements that are most frequently automated in today's commercial animations.



All of the scenes—including this one of the interior of Goofy's home—for Kelly Day's latest Disney project, *Goof Troop*, are created on the Amiga.

Up to now, the success of the Amiga at Disney has led two other TV animators in Day's shop to learn the computer, and by the time this piece is published, there should be nine Amigas there.

For those aspiring to Disney heights, Day has a few words of advice. "Studying traditional animation is the best thing you can do. As computers get more powerful, they are easier to use. Animating will be effortless," Day argues. "It will be the people with the best ideas and skills that will make the highest mark."

We are sure that Day would agree, however, that it is still important to develop computer skills so that you can be ahead of the game when businesses discover new ways of doing old things.

—Doug Barney

any time unit you prefer, although I recommend the Frame setting when working with animation. Close the requester and double-click on the Scene icon to open it.

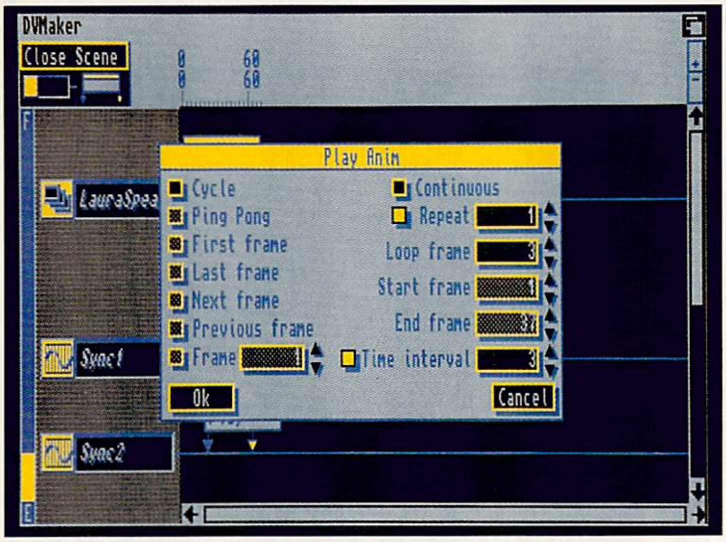


Figure 7. After placing an Animation Event icon on the Animation track and double-clicking on it, select PlayAnim from its requester to bring up the Animation control panel shown here. Then...

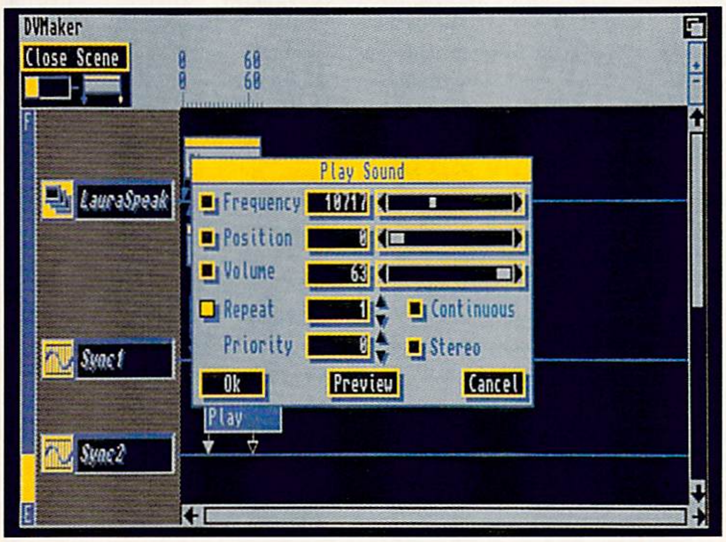


Figure 8. ...In similar fashion, place a Sound Event icon on the Sound track and select Play to open the Play Sound requester shown above.

Next, pull down a new track by clicking on the leftmost icon in the top-left corner of the Scene display. Drag it into place anywhere on the empty screen. When the Choose A Track selector appears, click on the box labeled Anim. Select the name of your file from the Load requester that appears.

Loading the sound is accomplished in a similar manner: Pull down a new track, select Sound from the display, and load the sound when the File requester appears. You are now ready to synchronize the two tracks.

First, pull down an Event icon from the pair of icons at the top left of the screen. Place it on the Animation track at time 0:00:00. From the requester, choose PlayAnim, which brings up the Animation control panel (see Figure 7). Click on the Cycle gadget to turn it off; it is on by default. This signals DeluxeVideo to play the animation once, but just to make certain, set the Repeat gadget to 1 and the Loop gadget to 3.

The most important item on this screen is the Time Interval box, which is used to control the playback speed of your animation. (Go back to this point first if the video and sound do not synchronize.) My example is designed to run at 15 frames per second, so I set the Time Interval value to 4. A value of 1 would display one frame every 60th of a second, two every 30th of a second, and so on. Thus, if you need to slow down the animation, make this number larger, and conversely, use a smaller number to speed up playback.

Click on OK to continue. To set up the sound file, drag a new event onto the sound track and select the Play icon to open the requester (see Figure 8). Because DeluxeVideo reads the sound file and adjusts the settings accordingly, the frequency, stereo, and volume settings should be correct. You are now ready to perform your first test.

Adjusting and Synchronizing Playback

As in the AmigaVision section, even if you follow my directions to the letter, there is no guarantee that your animation and sound files will be in sync. DeluxeVideo's timing routines depend on many variables, from disk loads during animation playback to the speed of the processor. Here again, avoid disk-loading waits by making a Load icon the first event on each of your tracks.

The contents of the animation file can also affect playback rate. For example, if your subject is moving from a plain to a detailed background, the processor needs more time to decompress the greater number of pixels in the new frame. Unfortunately, DeluxeVideo does not compensate for this variable frame rate, so you have to work around it.

If the discrepancy is small, simply adjust the video or audio playback speed until the two match. Or, for more serious problems, the fix is once again to break the sound sample into smaller pieces, synchronizing each to its appropriate video frame with the timeline. Try to confine your audio cuts to places where the speaker pauses; DeluxeVideo has the annoying habit of hesitating slightly between audio events while it prepares the data, thereby inserting unwanted pauses between words.

Creating a Successful Mix

It is one thing to have the tools to create, it is another to use them creatively. The successful marriage of sound and animation is most dependent on timing: Even the right sound, if it does not occur at the right time, falls on deaf ears. This is a crucial point, but difficult to teach in print. Your best bet is to study films and television to see not only when, but why, a sound effect occurs at a given time. You will soon notice that pace, as much as situation, plays an important role in the success of any piece. In other words, the build-up, or anticipation, is as important as the final event. Use your creativity and these tips to prepare for the coming age of sound...on your computer. ■

Gene Brawn is a digital animator, graphics designer, and frequent lecturer, as well as a contributing editor to this magazine. Write to him c/o AmigaWorld *Editorial, 80 Elm St., Peterborough, NH 03458.*

Shortcuts to Success

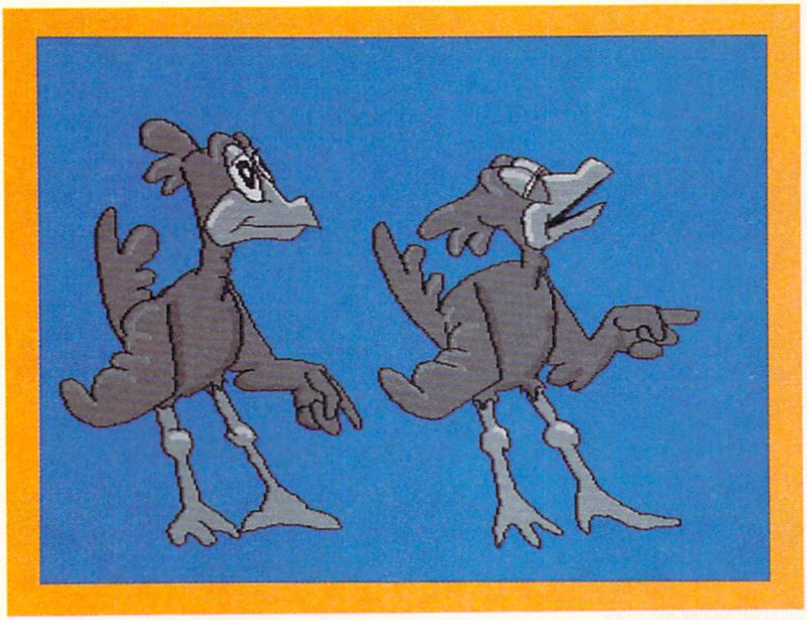
Proven techniques used by traditional animators to save valuable time can easily be applied to creating animations on your Amiga—as these hands-on tips will clearly demonstrate.

By Derek Grime

Animation is magic. Whether you are watching the classical beauty of *The Little Mermaid* or the computer realism of *Terminator 2*, animation fascinates like no other medium. Since its renaissance in the 1930s, studios have been developing shortcuts for producing better animation more quickly and easily. But these tricks of the trade are not just for the Hollywood set. You can use many of these secrets in your own Amiga-based productions.

A One and a Two...

What is so time-consuming about creating animation? You simulate motion by drawing frame upon frame of discrete images. The earliest animators created a picture for each frame, a technique known in the business as "animating on ones." Film runs at a speed of 24 frames per second, so animating on ones means you create 24 drawings for each second of film. Video has an even higher frame rate. NTSC video runs at a rate of 30 frames per second, which means that to animate on ones, you must produce 30 pictures per second. As you can imagine, drawing so many images is a laborious and slow process.



"Hey, you on the left, if the boss hadn't spilled his guts in this piece, people'd think you wasn't really me, y'know?"—TRACE & REPLACE—read on!

It did not take long, though, for those pioneers to discover that they could produce a drawing for every two frames of film (called "animating on twos") without the viewer noticing the difference. Even the best shorts from the Disney and Warner Brothers studios are created this way. By animating on twos, you can cut in half the hours it takes to produce an animation.

Despite what you may think, an animation that changes images every two frames does look smooth. When it comes to seeing motion, our eyes are pretty slow. In fact, we can register only about ten separate images per second. At any faster rate, all frames run together smoothly. This phenomenon, known as the persistence of vision, is the reason we can watch film or video without being aware of the individual frames.

If your production time is limited, you can get by with lower frame rates. If you include fewer than ten frames per second, however, your animated motion *will* seem jerky. Most Japanese animations play at a far-less-than-ideal four frames per second. Although this may not be up to Dis- ►

ney standards, even these achieve some broad level of public acceptability.

Motion Blur

Although animating on twos is a great shortcut for character animations, 3-D graphics do not fare as well at lower frame rates. Gaps in a 3-D picture's motion are much more noticeable to the human eye, because its image is more rigid and better defined, and its motion is linear.

So what is the trick to creating top-notch 3-D animations? Try adding "motion blur." Although some products such as NewTek's LightWave 3D (packaged with the Video Toaster) support motion blurring, you can achieve the effect without special software.

Take the individual frames of your artwork and load them into a paint program or an image processor. (I used ASDG's Art Department Professional for my example.) Run the program and make sure that the Composite or Comp setting is on. Then load a dummy or black frame in the same resolution and number of colors as the rest of the animation. This allows your program a clean blank canvas on which to work.

If you want to blur the tenth frame in an animation, load the eighth frame, and when the Comp setting comes up, change the mix value from 100 to 20 percent. This value loads a faint ghost-like version of the picture. Next load the ninth frame, only this time change the mix setting to 50 percent. Finally, load the tenth image and use a mix setting of 100 percent. This example blurs the picture two frames back, but you can also use the technique to blur much longer frame sequences.

In any event, even a one-frame blur seems to make the animation smoother. Try this technique on some existing work; it may breathe new life into an old piece.

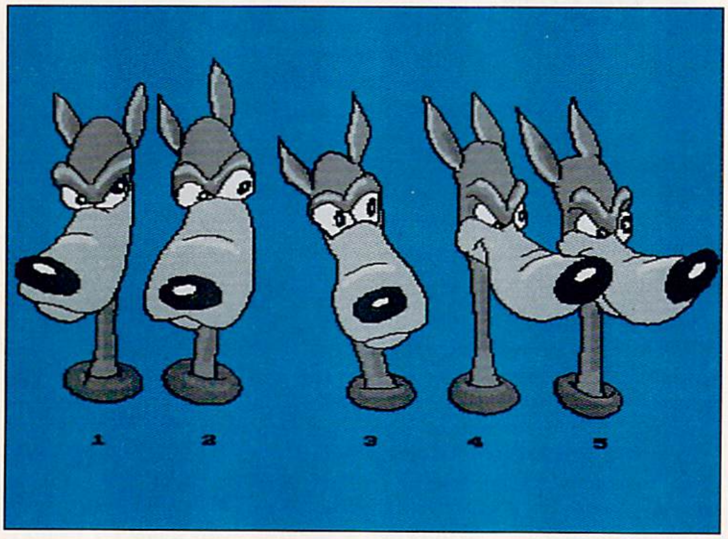


Figure 1. Composite of key frames and 'tweens.

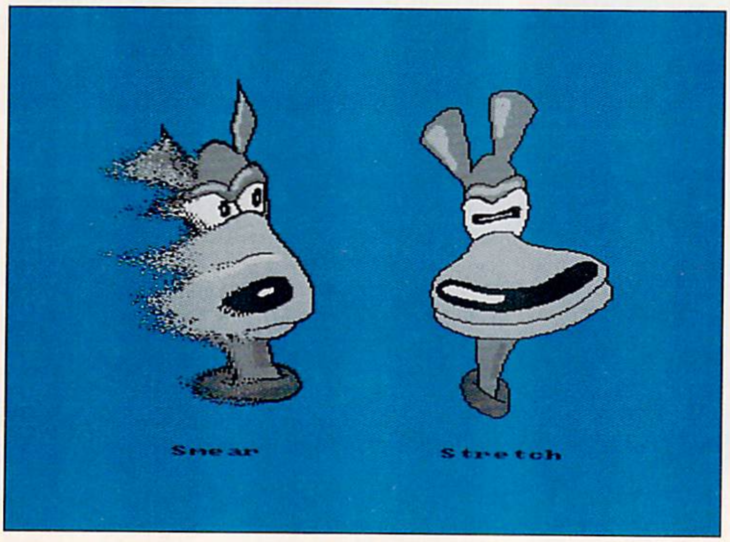


Figure 2. "Smear" and "stretch" techniques.

Smear and Stretch

In classic animation (the kind popularized by Disney), objects are always animated from pose to pose. (A pose is any part of the animation where things come to a temporary halt.) These frames, known as key frames or extremes, are a pleasure to create because they bring life to the character. If you want a character to turn its head, for example, you need to create a key frame of that character looking to the left and another looking to the right. After the keys are finished, though, you still have a lot of work to do: In between those two positions, you may need from one to 20 additional drawings. But there are time-saving tricks for this task, too.

Figure 1 is a composite of five different animation frames that portray a big bad wolf turning its head from one side to the other. The first and fifth ones are the key-frame positions. You can see that the second and fourth drawings are close to the keys. This is known as "slowing in" and "slowing out." The animator "weights" the drawing toward the keys—thus adding acceleration and deceleration to the motion—to produce a more realistic sense of movement. As a bonus, those two in-betweens are a snap to draw. You can essentially trace them from the key frames.

The real job in portraying the turning of our wolf's head is to determine the position of the third frame. The early animators discovered that liberal use of the dry brush saved a lot of drawing time. Instead of sketching the quick-moving in-betweens, they used simple speed lines, such as a series of curved streaks, to cover the same ground faster. Most paint programs can help you create these lines. With Electronic Arts' DeluxePaint, for example, simply take copies of your key frames and use the Smear command to streak them.

By tracing an elongated version of the key frames, you can also whip up a fake key frame (see Figure 2). This technique is known as a "stretch." Although it looks strange, you can use it effectively. Amiga animator Eric Schwartz is a great believer in the stretch method. Check out one of his many fine Moviesetter public-domain animations. Figure 2 shows both a smear and a streak version of the same in-between.

Trace and Replace

The object of an animation shortcut is to reduce drawing time as much as possible. If you have created a pose that captures the mood of the scene, you should use it again and again. But re-creating your drawings takes too much time—unless you cheat a little. Traditional studios photocopy drawings and paste them onto the scene. But because this technique can make a sequence look too static, they often rotate and resize their pho- ►

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Landscapes #APA4

Save time and frustration in creating landscapes for images and animations.

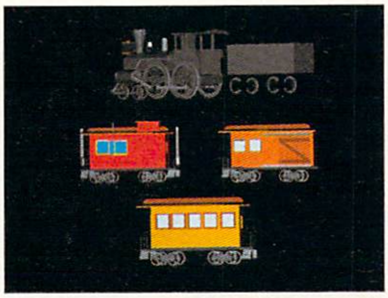
Cyberscape 1.2 generates fractal terrain and saves it as a 3-D object file in either Sculpt 3D /4D, Turbo Silver 3.0, or Lightwave 3D (Video Toaster) format.

Sculpt Terrain 1.0 creates script files for use with Sculpt 4D.

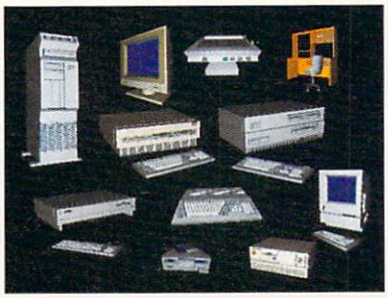
Snackbar #APA5
(Imagine format)

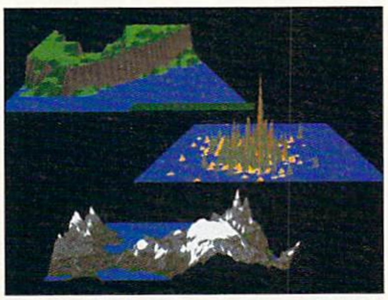
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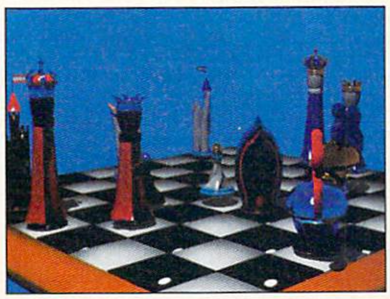












Trains #APA6
(In Sculpt format)

Locomotive2, Caboose, PassengerCar, BaggageCar

Entertainment #APA7
(In Sculpt format)

Banjo, Guitar, Bugle, Piano, Trombone, Trumpet, Violin, Lantern, OilLamp, PotbellyStove, SpinWheel, Stool, Camel, Diver, Spaceman, Jack-In-Box, ToyElephant, ToySoldier

Computers #APA8
(In Sculpt format)

1000Computer, 1000Keyboard, Amiga_Keyboard, 2000Computer, 3000Computer, 3000Tower, 500Computer, Camcorder, Drive&Disk, IBM_PS2, Macintosh, Mac_Keyboard, Monitor, Mouse, Printer, Workstation

Chess #APA9
(In Sculpt and Turbo Silver formats)

Bbishop, Bcastle, Bking, Bknight, Bpawn, Bqueen, Chessboard, Wbishop, Wcastle, Wking, Wknight, Wpawn, Wqueen

Honeybee #APA10
(Imagine format)

Bee, Daisy, Glad (flower), Honeypot, Rose-Full, Rose, Candle1, Candle2, Lantern, OilLamp, WaterPump, WellBrick, Face1, Face2, Lizzie (car), DeliveryTruck

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tocopies. Trying to replicate this effect on the computer can be tough, because computer images are made of thousands of small pixels. Even the best paint programs rotate or resize a bitmap so roughly that this trick is of little use to the animator.

A technique known as "trace and replace" solves the problem of re-creating images quite nicely. If you have a drawing tablet, trace the key frame into the paint or animation program. For the next pose, simply rotate the head so that it looks upward, but redraw the body in the same position. Be careful to make sure the axis is correct. When rotating the head, hinge the motion on the base of the neck. All the in-betweens can be tracings of the angles between the keys. Nothing could be easier.

To make it look even better, try to vary the object a little. In the illustration on the opening page of this article, I roughly traced the bird's body and the hand, and then rotated the hand. Next, I traced the head and rotated it, then shut the bird's eyes and opened its mouth.

The trace-and-replace technique is widely used. Some cartoons such as *The Flintstones* employ this shortcut repeatedly. Watch Fred's head as he talks. That up-and-down motion was traced and replaced.

If a deadline looms, you can even forego the tracing and just reuse a copy of all the static elements in the scene. Instead of animating Fred's entire head, for example, just re-create his moving mouth. Although most animators would not recommend straight copying, it can get you through a tight spot. Push the envelope as far as you can, but be careful: Many Saturday-morning shows abuse shortcuts to the point of killing an animation's entertainment value.

One advantageous function of trace and replace is that it prevents an animation from "breathing," the term for the phenomenon of a character shrinking or growing between the key frames. Novices should force themselves to use many key frames, maybe even twice as many as they think necessary. Keeping your poses close together is good discipline, and it makes the motion easier to animate.

Animation is as old as film itself and has a history just as rich and varied. The generations of animators who preceded you discovered some excellent shortcuts that you can easily incorporate into your Amiga animation projects. ■

Derek Grime has run Beyond Graphics since 1985. Recent clients include Disney, MTV, Nickelodeon, and Commodore. Write to him at PO Box 1249, Station F, Toronto, Ont., Canada M4Y 2V8.

AMIGA PROFILE

Mad Scientist "Explains It All"

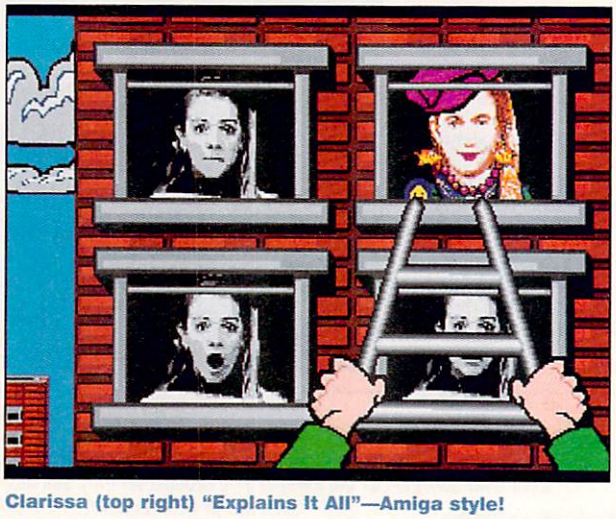
IT ALL BEGAN on Halloween in 1985. While folks of all ages were trying on costumes or dunking for apples, *Derek Grime* was in a computer store buying his first Amiga.

Grime, who had studied character animation for three years, instantly grasped the animation potential of the Amiga's real-time graphics. And two months after purchasing an A1000 with 256K of RAM, Grime founded Beyond Graphics in Toronto, Canada, and was doing broadcast work for CBS.

Grime calls what he did then "mad-scientist work." It seems that there were always television shows where some slightly crazed scientist is at work in a lab. The more modern labs usually included computers, and Grime would fill their monitor screens with output from the Amiga. Because of its video timing, the Amiga images could be broadcast without the annoying flicker or rolling that occurred with other systems.

Grime has taken this approach many steps farther in the Nickelodeon weekly sitcom *Clarissa Explains It All*. In that series, a teenage girl named Clarissa is always scheming to get out of work or weasel her way out of a jam. Clarissa uses her Amiga 500 to turn her ideas into computer simulations.

Of course, Grime created the "Clarissa" show on his Amiga, using Electronic Arts' DeluxePaint IV and DeluxeVideo. He has already completed 13 episodes of the show, and he recently did some "top-secret" experimental work for MTV. For the last four years, he has also produced Commodore's commercials for Canadian television.



Clarissa (top right) "Explains It All"—Amiga style!

Grime offers a bit of advice for aspiring Amiga animators and videographers: "Don't quit your day job." He also suggests defining or discovering a market. Once you have picked out a target, he says, "concentrate on what you are good at. Don't try to be everything to everybody. Keep your portfolio really short. They will know in two minutes if they want to hire you."

It is good to have contacts in your chosen field when looking to obtain jobs. Phone around, but "don't pester," he advises. Direct your inquiries to the Media Services departments of large companies. "These guys are open to looking at new stuff," Grime explains. And sometimes that pays off handsomely.

—Doug Barney

Reflection-Mapping Magic

Amiga animators can add spectacular special effects to their creations by using sophisticated reflection-mapping techniques.

By Tim Wilson

One of the hot phrases making the rounds of special effects and computer graphics studios these days is "reflection mapping," also known as environment mapping, spherical mapping, or cubic mapping. All these terms refer to a technique used to simulate reflections of real-world images on 3-D objects that are modeled and rendered on a computer.

Industrial designers have been using reflection mapping for quite some time to simulate realistic reflections on computer-generated images of cars and other products so that they can more accurately visualize the products before building physical prototypes. Until recently, the use of reflection mapping was limited to high-end graphics workstations that employed special rendering software.

Along with the technology for scanning and recording computer-generated images on film has come a new use for reflection mapping: motion picture special effects. Movies such as *Terminator 2* and *The Abyss* demonstrate the extraordinary power and realism these images can evoke, and they have sparked an interest in new uses for computer graphics, especially in the entertainment field.

The good news for Amiga users is that the gap between the capabilities of high-end workstations and PC-based computer graphics has been steadily closing over the last few years. The Amiga and its developers have been primary leaders in the rapid growth of low-cost computer-graphics software. Amiga 3-D graphics users have now come to the point where they can perform very sophisticated techniques, such as ray tracing and reflection mapping, that only a few years ago were reserved for studios with million-dollar budgets and numerous workstations.



The Steps Involved

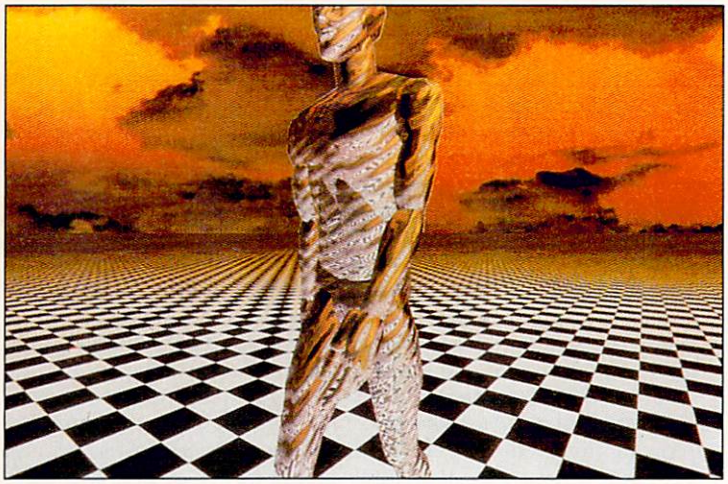
The process of reflection mapping is really much less mystifying than you might imagine, and the resulting images can be quite astonishing—as you can see from both the cover image and the illustration that opens this article. The basic steps are these: You must first digitize an image of the landscape or other environment in which you want to simulate placing your object. You can then use a 3-D modeling and rendering program to build the object and map the real-world image onto it as a reflection. Finally, you com- ►

posite the real-world image as a background behind the rendering of your reflective object, giving the illusion that the object is actually within the landscape and reflecting it.

There is a wide variety of Amiga-based software and hardware that you can employ to perform the tasks described above. Also, your images can be manipulated in practically any resolution, including lo-res, HAM, and 24-bit. In this article, I'll stick to a discussion of 24-bit, as anyone intent on working with graphics should use that format. Price is no longer an excuse: If you can afford the software to do the rendering, then you can probably afford some of the lower-priced 24-bit or pseudo 24-bit displays to work on your images. (See "Brave New Worlds of Color," p. 78, for a discussion of enhanced display devices.)

DIGITIZING

The first step in getting your image into the computer as data—or digitizing it—is to decide what environment you want to portray. The easiest way to go about this is to use an already digitized image. ***Texture City*** offers some beautiful real-world images of clouds and landscapes in 24-bit files that might be just right for your job. If you are sufficiently industrious and skilled, you can paint your own image using 24-bit paint packages such as ***Digital Creations*' DCTV Paint** (bundled with DCTV, $495) or ***Impulse*'s Light24** (bundled with Firecracker 24, $995). Keep in mind that your image does not have to be a landscape—many different things can give you an interesting looking reflection on a 3-D object.



Anti-Gravity Workshop, Santa Monica, California.

The best way to give the illusion that your object is in a specific environment is to either grab a frame that has been shot with a video camera or to take a photo of the scene and then scan it. Personally, I prefer the second method. Because much of my work is intended for final output to film, I need to be able to manipulate images at much higher resolutions than standard video.

I use the Epson ES-300C scanner, which has driver support from both ASDG and Impulse and can scan 24-bit images in super-bitmap resolutions larger than most Amiga software can handle. I generally scan images at a resolution of about 2K, or 2048×1366, which is the standard resolution used to output computer graphics to motion-picture film or slides. The amount of memory needed to process images at this resolution is, however, considerable.

Even so, one of the best ways to get a very detailed image for video is to start with a super-bitmap and scale it down by using a program such as ***ASDG*'s Art Department Professional** ($240). AD Pro's resampling does superb antialiasing and gives the impression of greater detail in an image of normal video resolution.

The ideal packages to use for straight video digitizing include ***Progressive Peripherals*' FrameGrabber** ($499.95), DCTV, and ***NewTek*'s Video Toaster** ($2495) and **Digi-View Gold** (199.95). You can use any of these to grab images from a video source at standard Amiga video resolutions, yet all work in slightly different ways. Some can be used to grab images from tape, while others are best capturing an image from a live camera. With a few of the packages, you simply point a color video camera at a scene and tell the software to digitize, and you have an IFF picture of your environment.

RAY-TRACING AND SCANLINE MODES

Let's assume you have successfully used one of the above techniques to create an image. The next step is to use a 3-D software program to map a reflection of the image onto a 3-D modeled object. A number of packages can do this job, including ***Impulse*'s Turbo Silver 3.0** ($199.95) or **Imagine** ($350), ***NewTek*'s LightWave3D** (bundled with the Video Toaster), and ***Activa International*'s Real3D** ($199; professional version, $499).

Imagine appears to be quite popular and is well suited for our example. Keep in mind, however, that you can apply the following techniques with other 3-D software programs as well, provided they have either a combination of brush mapping and ray tracing, or support reflection mapping directly in other render modes.

Imagine can perform ray tracing and scanline rendering, either of which you can use, but scanline renderings are much faster. It is important to understand the distinction between reflections in ray-trace and scanline modes. Ray tracing can create true reflections, shadows, and refractions. Scanline rendering does not support these features; instead, it simulates reflections with environment mapping, and does so in far less rendering time than a ray trace of a similar scene.

In scanline mode, objects reflect only grounds with textures or images wrapped on them, or global colors for the horizon and zenith. You can also assign a brush to the globals, and the program will create a spherical reflection map on your reflective objects (see Globals, below). Remember, though, that in scanline, objects cannot reflect other objects, but only the environment.

In ray-tracing mode, objects can reflect anything in the scene, so it is possible to bring in a series of real-world images, wrap them on planes or other objects, and orient them in many different ways so that they reflect off of your principal objects. You can also reflect global images in ray-tracing mode.

MODELING

Before doing reflections, you must first have an object modeled. Any 3-D object can be reflective in Imagine, but Phong-shaded objects with curved surfaces seem to reflect images in more interesting ways than those

that are flat. Also, the limited resolution of the mapped image is often more obvious when reflected off a flat surface. In others words, the pixels of the reflected bitmap can appear enlarged. Adding a disturbed texture to a flat object can sometimes improve its appearance by distorting the reflection.

If you feel you are not very talented when it comes to modeling, there are BBSs that have libraries of objects modeled by other 3-D artists. Studio Amiga in Texas, Valhalla and Steve Worlie's Imagine BBS in California, and Programs Plus & Video in Ontario, Canada, all have Amiga 3-D information and objects that you can download. (For further information on how to reach these services, see the "Resource List" in the article "Reference and Resources" on p. 119.)

The most important aspect of an object is its attributes, which can be set from within Imagine's Detail editor. The object must have some level of reflectance, so it is crucial that you set the red, green, and blue (RGB) Reflectance controls at about halfway up, or even higher. Try starting at about 150, and then make adjustments as needed.

As long as you do not have Reflectance set all the way up to 255 (perfect reflector), the object's color will balance with its reflectivity. The appearance of your object will be a mix of the two, so you can tint your object's reflections by favoring components in its Color and Reflect values. For example, you might favor blue slightly with steel, or a yellowish color with gold. As there are, in reality, no perfect reflectors, this mix of surface color and reflectance usually yields more realistic results.

Two other attributes that will make your effect more convincing are Specularity and Hardness. Specularity controls the color of the highlight on the object; it actually limits the range of color that bounces back as a highlight. For metals, you may want this highlight to be similar to the color of the object—for instance, a bluish tint for steel and a yellowish tint for gold. For diamonds and other very hard materials, you can set RGB all the way up for a very bright highlight.

Hardness controls how the highlight spreads out. A softer object has a lower hardness and a highlight that is more spread out—if it has a highlight at all. A harder object, such as a mirror or a diamond, has a maximum hardness (255); metals are actually rather soft in comparison (around 75). Liquids like water should probably be set very hard. No doubt you will want to experiment in each case until you achieve the desired result. If you are doing a trace, try adding some Refraction and Shininess, which will appear to put a thin layer of glass or lacquer on the object and will enhance the reflection of colors.

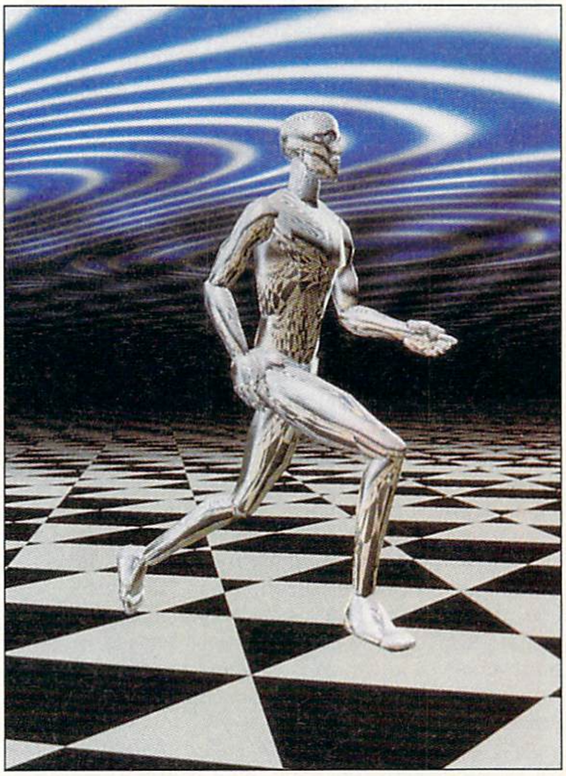
Imagine also offers the ability to add to an object Textures or Brushes that can make only selected areas of its surface reflect a certain color. The theory here is the same as it is for the basic Reflective attribute, only the colors on the Brushes take the place of the RGB settings for Reflectance.

An object's reflective properties can also be combined with some degree of transparency through the Filter settings. This gets a little more complicated, because you start to see reflections off the inner surfaces of your object, as well as from the outer surfaces. In addition, Filter does not work in conjunction with Shininess. Semitransparent reflective objects, however, can look truly spectacular if done well, especially when animated.

When you have finished with Attributes, save your object, open a new Project, go into the Stage editor, and load the object. Add a few light sources and distribute them throughout the scene—one main and one fill are good—and point your camera at the object.

GLOBALS

The critical part is now working with the Globals in Imagine's Action editor. Think of a Global as a large sphere surrounding your scene. During rendering, the image named in the requester will, in essence, be



Anti-Gravity Workshop, Santa Monica, California.

wrapped on that large sphere, and any reflective objects in the scene will have that surrounding image mapped onto the entire surface like a reflection.

To create a spherical reflection map, enter the drive, directory, and name of the digitized image in the Brush name blank. Multitask with **Disk Master** ($49.95,***Progressive Peripherals***) or **Directory Opus** ($59.95, ***INOVAtronics***) to make sure you have the correct full name.

Once you have entered the Brush name, leave the other settings in the Global requester alone, with the exception of Ambient. Put a number, say 25, in the blank for RGB. This step is crucial for compositing the image later on. It ensures that the background is the only part of the image that is totally black. Ambient at 25 adds a little light to all the objects in the scene, just enough to prevent any part of them from being totally black.

When you are finished, save the changes, exit the Action editor, and head into the Project editor. Before rendering the image, make sure that the Edge Level (EDLE) is at 255 in the Imagine.config file. This will prevent the edges of the object from being antialiased into the black background and will also give you a nice crisp edge for the overlap of the composited images. ►

Next, reconfigure Imagine, or close and restart it, and then open a Rendering subproject and generate an image. Remember, the render mode can be either scanline or ray trace.

Compositing

The last step is to combine the rendered object with a background. Both LightWave 3D and Imagine 2.0 allow an image to be loaded as a backdrop during the rendering of an object. This can save you the extra step of compositing your real-world image as a background to the object. Another advantage to this is that your object can be automatically antialiased with the backdrop. In this case, before you render the image in Imagine, set the EDLE to 0 for full antialiasing.

If you choose to use a paint or image-processing program for compositing, the edges of the object will probably be jagged and require some touching up to blend the contours into the background. There is more flexibility in the placement and size of the object on the background, however, and it is not necessary to rerender each time you wish to make a change.

AD Pro is very good for basic compositing. First, the background image is loaded, and then the rendered object is loaded in Composite mode with the black background set as a transparent color (in the Composite requester, RGB is set at 0). The relative positions of the images can even be offset.

When using a paint program, the idea is to cut out the rendered object as a brush, and then apply it to the background image where you want it to be. Paint programs such as DCTV Paint and Light24 have special features that are ideal for this type of image manipulation. Both offer second pages so that you can load the rendering into one and the background into the other. They also have Fill tools that allow you to mask areas of an image so they cannot be accessed, which makes it much easier to cut the object out of the image.

Pick up the brush by simply surrounding the object with a solid paint tool. The mask prohibits you from picking any of the background as part of the brush, so the contours of the object (and brush) are cut precisely and automatically.

Once the brush is lifted, simply move to the other page and apply it where you wish. Both DCTV Paint and Light24 allow you to manipulate the size, rotation, and transparency of the brush, so you have great control when placing it over your landscape. Keep in mind, though, that rotating and sizing require a resampling of the image data, which could result in a noticeable loss of detail in the brush.

Variations on a Theme

If you have successfully completed these three steps—digitizing, rendering, and compositing—you should now have a dazzling scene of a reflective object on a realistic background. Remember that there are many possible variations of reflection mapping that you can perform with different Amiga software.

For example, try cubic mapping in Trace mode. You can take photos of the four walls, ceiling, and floor of a room, and map them onto corresponding faces of a cube. Then set your camera and reflective objects inside the cube and ray trace it. Or, if you want to genlock your reflective object over live video, you could render it in Interlaced HAM mode with the background set to color zero.

There is plenty of room for invention with reflection mapping. It can be especially spectacular when used in 3-D animation. As objects move, the images reflecting from their surfaces yield beautiful modulations of color. ■

Tim Wilson is a cofounder of the Anti-Gravity Workshop, a (as the group characterizes it) "fledgling computer-graphics studio with a mission to implement the best the Amiga has to offer for high-quality graphics and animation...and to develop a setup to compete with the old guard of Computer Graphics (CG) studios." In addition to this article, Tim also produced the image for our Special Issue cover. For more on Tim Wilson, see "Defying Gravity" on p. 128.

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#TSP6. 3D Vector Objects #1 Lamp, mirror, bed, chair, fire hydrant, lamp post, street lamp, street sign, traffic light, cannon, cannon supplies, rose, fork, spoon, knife, plate. All objects are in Sculpt format.

#TSP7. 3D Vector Objects #2 Books, Early American telephone, barrels, gun, spaceships, lamps, trombone, bugle, skateboard, Lego-Rover, remote control, glider airplane. All objects are in Sculpt format.

#TSP8. Clipart B&W and colorful clipart for a variety of needs. People, holiday clipart, school items, scrolls, food, monsters, fish, lobster, symbols, and more.

#TSP9. Utilities #1 *IconMeister.* Icon editor with a complete set of tools. *TJFormat..* A disk formatting program. *Chartmaster.* A graphing tool that allows you to generate and save different graphs. *Graph3D.* Visualize complex data in 3-D manner and save the results. *StrucGen.* Create gadget, text, bitmap, and window structures and write the C source code to disk. *LabelMaker.* A very easy-to-use label program. *DoublePrint.* Prints your text files on both sides of the paper.

#TC11. (Sept/Oct 89). *DiskSalvage* will fix corrupted disks and recover deleted files. *IconMeister* is an advanced Icon editor. *AlienDuel* is a fast, shoot'em-up game. *Crystal Caverns* is a colorful, graphic adventure game. Plus an animation, sound samples, 3D dinner table objects, and Hi-Res monster clipart.

#TC12. (Nov/Dec 89). *TJFormat* formats disks that AmigaDOS chokes on. *ChartMaster* is a powerful graphing tool. *MoreCandy* generates an assortment of colorful graphic patterns and saves them to disk. *Shark,* a game where you have to eat all the little perch you can catch to stay alive. Plus B&W clipart, spaceship 3-D vector objects, an animation, and Speakeasy (C source code for the programmer who wants to add speech to C programs).

#TC13. Jan/Feb 90). *StrucGen* lets you create gadget, text, bitmap, and window structures and writes the C source code to disk. *Lifecycles* plots your biorhythms. Create spectacular images with *Mandelbrots. Look,* a CLI utility that helps you find files on your disk quickly and easily. Plus 3-D objects, holiday clipart, an Amiga Flight animation, drive head cleaning utility, and a technical discussion on how AmigaDOS stores information on disk.

#TC14. (March/Apr 90). *Amigo File* is a database & addressbook. *Graph 3-D* lets you visualize complex data in 3-D manner and save the results. *3-D TicTacToe. Spectrogram* analyzes and displays digitized sound. *Pteronadonaball,* an animation by Lou Markoya. Plus 3-D objects, food clipart, and sound samples.

#TC15. (May/June 90). *Labelmaker* is a very easy to use label program. *SurroundCycles,* a high-speed arcade game. *Dot2Dot,* an adaption of the classical connect-the-dot game. Animation by Brad Schenck that also is a tutorial on animation techniques. Collection of clipart, plus animal sounds.

#TC16 (July/Aug 90). *Cyberscape* generates complex 3-D vector objects of terrain and saves your objects in Sculpt or Turbo Silver format. *Mathplotter* graphs mathematical equations in both 2-D and 3-D. *Double Print* prints your text files on both sides of the paper. Plus *Metamorph* (a graphic adventure game), *TinyBall* (the World's Smallest Baseball Arcade game), and six digitized sound effects.

#TC21. (Sept/Oct 90). *Circe* is a "Risk-style" game where you battle the computer to take over the planet Circe. *Batchman* allows you to execute CLI programs, batch files and ARexx scripts by clicking on a gadget. *Colors* prints color test sheets and assigns RGB values to printer and screen output. *Easyfile* is a powerful database for home or small business. *Sprite Editor* lets you create animated sprites. Plus 3-D fruit objects, and five sound samples.

#TC22. (Nov/Dec 90). *Amiga Checkbook* is a fast checkbook manager with check printing ability, budget analysis, and a report writer. *AmiCrypt* is a file encryption/decryption tool. *WaveSyn* lets you design instruments and waveforms for use in other programs. It also lets you play your keyboard like a piano. *Cinco* is a game where you try to get five Xs in a row before your opponent does. *AlterCLI* lets you change attributes of your CLI window with a single command. Plus an animation by Lou Markoya, and 3-D objects.

#TC23. (Jan/Feb 91). *WhereIs* lets you quickly find a misplaced file on your drive. *Select* creates a window from which you can run your favorite programs. *MatheMagic* lets you find the day of the week for any date in the century, lets you enter statistical data to be analyzed, graphs data, and solves linear algebraic equations. *Pointer List Maker* lets you create your own pointers or import pointers from other programs and save them in a disk file. *Dyno-Wars* requires more strategy and thought than your regular checker board game. Plus *Mr. Monster* and *Trilon* games, 3-D objects, six sound effects, and a Pretzel animation.

#TC24. (March/Apr 91). *TableMaker* is a tool for building tables of all sorts. *"Koooties"* is a fun game where you have to assemble a bug before the computer beats you to it. *HT (HyperText)* lets you put links in a text file to other text, graphics, sound, animation, music, ARexx, and other applications. *The Little Black Book* is a telephone and address book. *Color Logic* is a Master Mind like game. The computer picks the colored pegs that you have to guess the positions of. Plus four disk and memory utilities, and animal sounds.

#TC25. (May/June 91). *ScreenTolff* captures your screen to an IFF file. *PopColors* lets you change the colors of your Workbench screen. *"Warrior"* is a fun shoot'em-up adventure game for one or two players. *Kaleidoscope* is a line drawing program. *Blockbusters* is a game where you get rid of blocks by pushing matching blocks into them. *Amidemo* demonstrates how fast the Amiga does solid-polygon animations. *Microscope* lets you examine memory at any location in the Amiga. Plus Hi-Res IFF brushes of all 50 states and 10 Canadian provinces, nine digitized sounds, and two small disk utilities and one printer utility.

#TC26. (July/Aug 91). *Word Search Maker* lets you create word search puzzles. *TimeCalc* is useful for anyone who has to calculate hours and minutes. *Drugbusters* is a fun game where you get rid of cigarettes, booze, pills and heroin needles. *Wordfinder* lets you search binary or text files for a particular word or string. *KeyClick* will add a small click to your keys when pressed and *MouseClick* will add a small beep to your mouse. *Seawar* is a game between the Allied Navy and the Empire Fleet. Plus Early American 3-D vector objects, digitized sound effects, and a simple DIR program.

#TC31. (Sept/Oct 91). *Calendar Publisher* allows you to personalize and print calendars. *CrossCircuit* is a one- or two-player action-logic game that calls for fast reflexes and fast thinking. *Apr* is a flexible printer utility. *Pizza Delivery Man* is a fast maze game where you deliver pizzas in your neighborhood. *MultiPlayer* displays IFF pictures or brushes as well as IFF sound samples. Plus *RAMGauge,* 3-D vector objects, and Hi-Res IFF brushes of all maps and flags in Europe.

#TC32. (Nov/Dec 91). *Computer Coloring Book* comes with 15 pages of pictures to color. *Listmaker* lets you make, edit, combine, and print lists of words. *Moresmooth!* displays text files on the screen. *Pocket Billards* lets you choose from several of the most popular pool games. *Texture* lets you create, manipulate, and save realistic fractal textured surfaces. Plus *Plague* (monster maze game), banjo and guitar 3-D objects, *Screen Fader, SnowBench,* and *FlipBench.*

#TC33. (Jan/Feb 92). *Measures1.0* converts measurements from unit or system to another. *DiskLabeler* is a database designed for storing and printing 3.5" disk labels. *Jewels,* a game of action and strategy. *Switch* a fun board game. *GFXclipper* captures and saves graphic screens. *Softball Manager,* a database for storing stats for players, teams and leagues. *WB Exec* allows you to execute CLI commands from WorkBench. Plus *Clipart* and an index of all the back issues of AmigaWorld Tool Chest.

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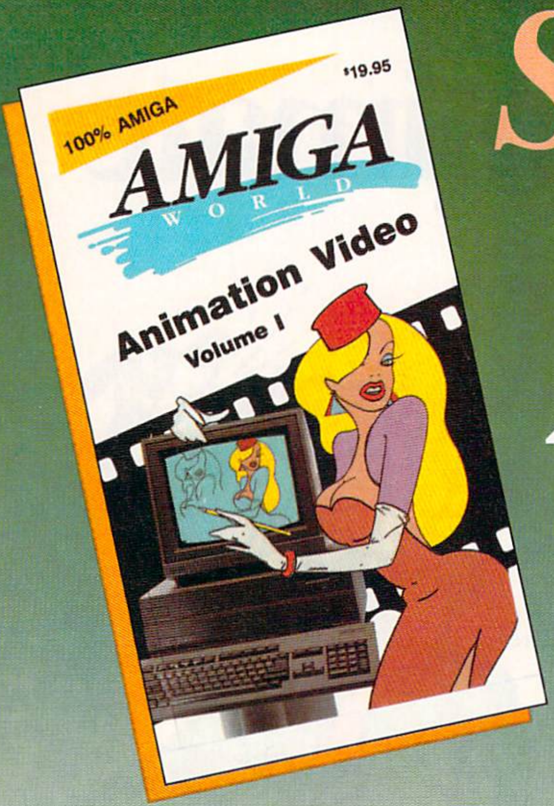
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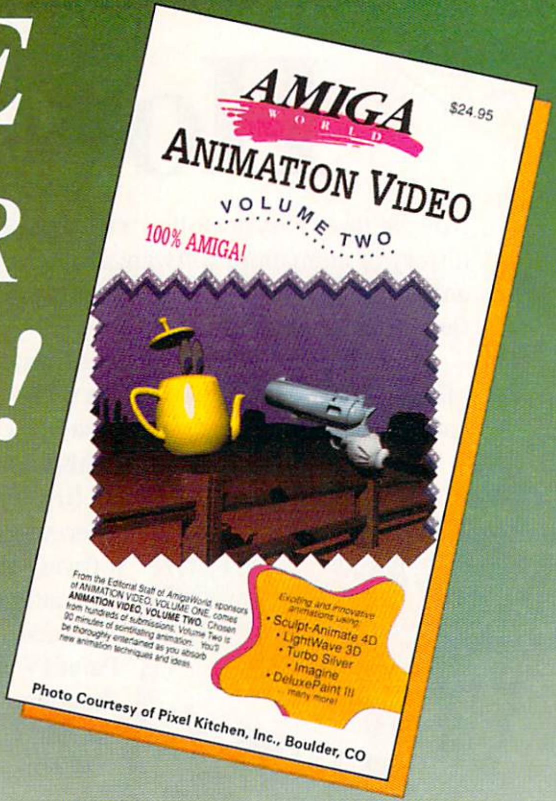
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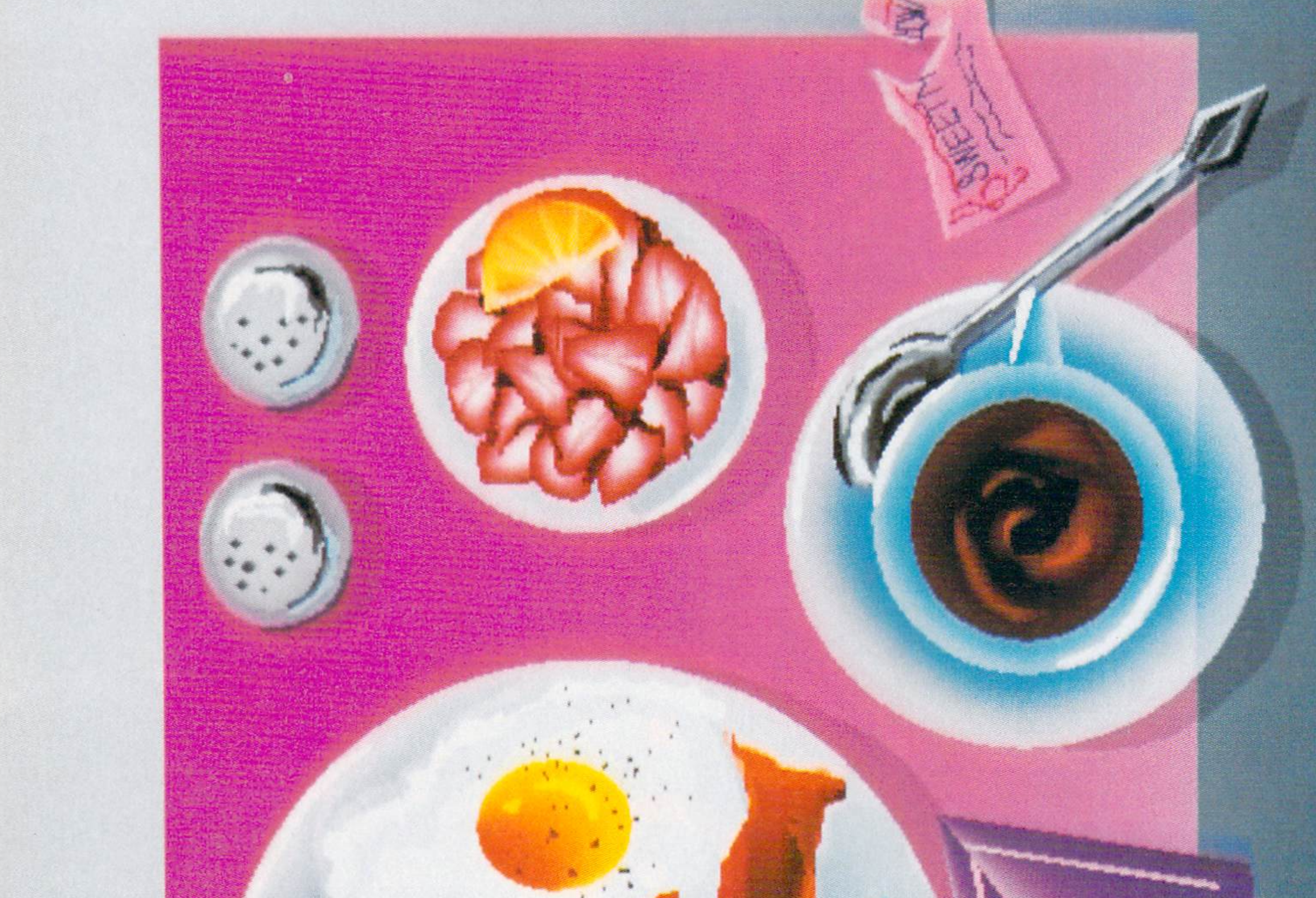
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Brave New Worlds *Of* COLOR

THE *AW* GUIDE TO ENHANCED DISPLAY DEVICES

24-bit (16.7 million-color) hardware has revolutionized high-resolution color-display on the Amiga over the past 12 months. This guide is for Amiga videographers and animators who need to know what constitutes the state of the art.

By Sheldon Leemon

A few years ago, you could get any kind of display out of your Amiga—as long as you were happy with the Amiga's standard graphics modes. As 256-color and even 16-million-color displays became more common on other computer systems, however, third-party hardware manufacturers responded with a bewildering array of boards and boxes to help the Amiga display images at higher color and pixel resolutions than are possible with its built-in display hardware.

Commodore never made any provisions for advanced displays on the Amiga, so third-party manufacturers had free reign with their designs. The result has been devices that can output anything from composite video to high-resolution RGB, and everything in between. Some work with standard external genlocks. Some combine enhanced displays with the standard Workbench screen, while others produce totally separate displays that require a second monitor. The display files these devices produce range in size from that of a standard hi-res Interchange File Format (IFF) to huge 24-bit IFF files. And the costs of display devices vary just as widely—from about the same price as a Commodore 1084 monitor to more than the cost of an Amiga 3000 computer.

Confused? You are not alone. With a brief look at and explanation of each device, this article should help clear up some of the confusion over the varying capabilities and requirements of enhanced displays.

COMPOSITE VIDEO DEVICES

As desktop video is the Amiga's major professional market, several display devices aim to provide video output that breaks the 4096-color barrier. Although they differ wildly in price and features, these devices do share some common characteristics. They all output composite (NTSC) video, which means that their signals can be recorded directly by a VCR. It also means that to see the display, you need ►

ILLUSTRATED BY CELESTE LAZAROU WALSH

more than a standard RGB monitor; you must connect the device to a composite (television) monitor or to the composite input of a multimode monitor, such as the Commodore 1084S.

The displays produced by these devices are secondary displays; you cannot run Workbench, or any other program that is not specifically designed for them, directly on these composite video devices. The



"Visitation," a DCTV-format image by Bill Graham.

composite video signal also prohibits the direct use of an Amiga-graphics overlay genlock with these devices. You can, however, feed their output into a genlock that is attached to another Amiga. (The exception to this rule is NewTek's Video Toaster, which includes an overlay genlock.)

All the composite video devices advertise 768×480-pixel resolution (National Television Standards Committee—NTSC—format) with 16.7 million colors, but these figures are somewhat misleading in connection with a television-style signal. The somewhat blurry nature of TV pictures means that they will always lack the sharp definition of a 768×480-pixel computer display. For the same reason, you cannot discern all 16 million different colors.

In general, the picture is similar to that of familiar television displays, with quality ranging from that of an inexpensive VCR to that of a high-quality laser-disc system. Obviously, composite video devices can be used only in countries that follow the NTSC standard. You will need a special version of the device for different standards (such as the newly available DCTV for PAL, the European video-format standard).

FrameBuffer

The first high-color composite video board, **FrameBuffer**, plugs into one of the 100-pin Zorro slots on the Amiga 2000 or 3000. FrameBuffer, which sells for $695, was developed by Mimetics, but is now being manufactured and sold by ***Reliable Communications***. The programs supplied with FrameBuffer allow you to display high-color picture files of varying formats (mostly those of 3-D rendering systems) with the board.

Third-party support of this board is limited, although a FrameBuffer Display module is included with ***ASDG***'s **Art Department Professional**, version 2. FrameBuffer provides a reasonable solution to the problem of displaying and taping high-quality output from 3-D animation programs, but it has never really caught on among Amiga video artists.

Video Toaster

NewTek's **Video Toaster** ($2495), on the other hand, is the most popular composite display device for the Amiga. The Toaster hardware consists of a board that plugs into the video slot of an Amiga 2000 equipped with a hard drive and at least seven megabytes of RAM. (Although new software for the board makes it technically compatible with the Amiga 3000, the end bracket that holds the Toaster's six BNC connectors—four inputs, two outputs—does not fit properly without modification of the A3000's case or the Toaster board itself.)

At first glance, the Toaster can been described as simply a composite output device, because it provides the only true broadcast-quality video of any composite card, and the included ToasterPaint software is capable of displaying any 24-bit IFF file. To appreciate the full scope of the product, however, you should give it a longer look. Many purchasers are buying the Toaster as much for its video switcher, framegrabber, digital video effects, character generator, and 3-D software as for its display capabilities. This collection of software makes the Toaster the best-supported Amiga display peripheral out of the box—so much so that the Amiga seems almost like a Toaster peripheral.

To further expand the Toaster's capabilities, NewTek has promised to provide Toaster programming details to third-party software developers after the release of version 2.0 of the Toaster operating system. The 2.0 software will also include control of the Toaster genlock, which can be used to overlay normal Amiga graphics on top of video. Currently, the Toaster can overlay its own extended-color graphics on top of video.

DCTV

Another very popular composite-display device is ***Digital Creations***' **DCTV**, which consists of a small external box that plugs into the RGB port of any Amiga (two or more megabytes of memory are recommended). DCTV may not provide as high a quality of output as the Toaster, but it costs only $495. With the included parallel-port cable connected, DCTV can also digitize a still video picture in under ten seconds.

Unlike most display devices, DCTV does not provide its own independent display. Rather, it takes the data from the standard Amiga display and interprets it as compressed analog-video data. This means that you cannot display normal Amiga graphics at the same time as DCTV graphics, because the latter uses the normal Amiga display. It also means, however, that DCTV images can be stored as normal hi-res Amiga IFF files that are about 100,000 bytes in size, rather than the 800,000 or more bytes required for a 24-bit image.

These DCTV pictures can be displayed by any software that shows a normal IFF picture, including Commodore's AmigaVision and similar presentation packages. The DCTV pictures can even be compressed into normal ANIM files for high-color animations that play back in real time.

This flexibility enhances the already formidable set of bundled software, which includes an image-processing program, the video digitizer, and DCTV Paint, one of the most highly regarded video-paint programs for the Amiga. The latest version of Art Department Professional (version 2) supports the creation of DCTV-compatible IFF images as well.

Low-Scan RGB Devices

The second category of display devices comprises those that output the same type of video signal (analog RGB at a 15-KHz horizontal scan rate) as the Amiga, only at higher color resolutions. For these low-scan RGB devices, you do not have to buy an expensive monitor; they work fine with the 1084. Their maximum pixel resolution is generally 768×480 interlaced, although Impulse's Firecracker display can go up to 1024 pixels wide.

Because their output is so similar to the Amiga's, all these devices work with external Amiga overlay genlocks, but not with internal genlock boards that tap directly into the Amiga graphics system. For the same reason, low-scan RGB devices do not work directly with deinterlacer boards (such as MicroWay's flickerFixer), although some allow you to use such a board simultaneously to provide a second, deinterlaced Amiga-only display.

HAM-E

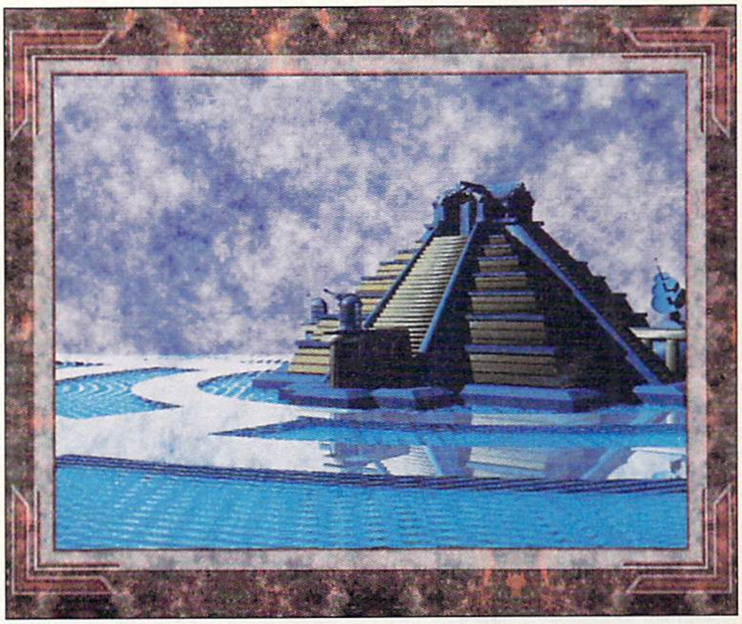
The least expensive of the group is ***Black Belt Systems***' **HAM-E**. In fact, at $299.95 ($429.95 for HAM-E Plus, which features built-in hardware antialiasing), it is the least expensive color enhancer available for the Amiga. HAM-E comes in a medium-size white metal box, has its own power supply, and plugs into the video port of any Amiga model. Similar to DCTV, HAM-E takes the normal Amiga display data and interprets it, but HAM-E provides an RGB output that goes to the same 1084 monitor as your normal Workbench display. (Digital Creations intends to offer an optional RGB adapter for DCTV in the near future.)

What HAM-E does, essentially, is convert a four-bit hi-res picture into eight-bit lo-res. By cutting the maximum picture width to 384 pixels, HAM-E can double the number of color bitplanes, raising the maximum number of on-screen colors from 16 to 256. In addition, HAM-E features an extended HAM mode in which it can display over 262,000 colors at once. As with DCTV, you can store all these images as normal IFF files, display them with any Amiga display program, and compress them into ANIM files that play back in real time.

Two or more megabytes of RAM are recommended in order to use the impressive array of software that comes with HAM-E: two paint programs and a powerful (if somewhat difficult) image-processing program. HAM-E has strong support from third parties, as well: Both ***Oxxi*** (**SpectraColor for HAM-E**) and ***Holosoft*** (**HAM-E Workshop**) offer paint programs for the box, and ASDG's ADPro 2 includes a HAM-E display module.

Firecracker 24

Impulse's **Firecracker** board is a true 24-bit display-buffer board that fits in a 100-pin Zorro slot of an Amiga 2000 or 3000. In fact, you can plug in more than one board at a time and achieve multiple displays.



Brad Schenck's "Ziggurat" 24-bit image.

Available in one-megabyte ($1000) and two-megabyte ($1500) on-board RAM configurations, the Firecracker board has a normal 23-pin output on the back and a nine-pin input that can be connected to the Amiga RGB port. This combination of connections allows you to display normal Amiga graphics, Firecracker graphics, or both, in a combined mode where the Firecracker display replaces any portion of the Amiga display that is drawn in the background color.

The board comes with several utilities that control the display modes, let you view 24-bit images, and more. Also supplied with Firecracker is **Light24**, a well-received paint program that allows you to paint in 24-bit color in real time, without the sluggish feel found in other programs. Software compatibility for the Firecracker is provided by its ability to display IFF24 files and an ADPro Display module, but several third parties are working on direct support as well. Black Belt is shipping a version of the HAM-E software that runs on the Firecracker board (called ImageMaster FC), and Oxxi is rumored also to be developing one or more products for the board.

ColorBurst

Centaur Software's **ColorBurst** ($699) provides a display that is somewhat similar to that of the Firecracker. The difference is that the external ColorBurst box plugs into the RGB port. Therefore, it works with any Amiga model, but you can only attach one per computer.

The software that accompanies ColorBurst includes ►

the usual picture display and slide-show utilities, as well as a paint program called CBPaint, which does not, however, take much advantage of ColorBurst's unique scrolling, color-cycling, and multilayer capabilities. Centaur admits that the software is still in a preliminary state.

Moreover, as of this writing, Centaur plans to discontinue production of the current unit in favor of a more advanced model, which should appear on the market this year. Owners of the current ColorBurst device will have the opportunity to upgrade to the new model.

Impact Vision 24

Great Valley Products' **Impact Vision 24** board ($2195) belongs in a category by itself. It is the only board designed to use the special combination video/100-pin expansion slot on the Amiga 3000. (On the 2000, the board plugs into the video slot and is connected via a ribbon cable to a 100-pin Zorro-slot ►

Feature Comparison: 10 Amiga Display Devices

	FrameBuffer	Toaster	DCTV	HAM-E	ColorBurst	Firecracker 24	IV-24	A2410	Resolver	Rambrandt
Manufacturer	Reliable	NewTek	Digital Creations	Black Belt	Centaur	Impulse	Great Valley	Commo-dore	Digital Micronics	Progressive Peripherals
List Price	$695	$2495	$495	$299.95	$699	$1000–$1500	$1995	$999	$1295–$2195	$3995
Output Type	Composite	Composite	Composite (1)	RGB	RGB	RGB	RGB/ Composite	RGB	RGB/ Composite	RGB
Horizontal Scan Rate	15 KHz	15 KHz	15 KHz	15 KHz	15 KHz	15 KHz	15/31 KHz	Program-mable	Program-mable	Program-mable
Genlock Compatible?	No	Includes	No (1)	External	External	External	Includes	No	No	Includes
Displays Workbench?	No	No	No	Yes	Yes	Yes	Yes	No	No	No
Amiga Models Supported	All	2000	All	All	All	2000/ 3000	2000/ 3000	2000/ 3000	2000/ 3000	2000/ 3000
Color Resolution	Millions	Millions	Millions	256/ 262,144	16 million	16 million	16 million	256	256	16 million
Max Pixel Resolution	768x480 (int)	768x480 (int)	768x480 (int)	384x480 (int)	768x480 (int)	768x480 (int)	768x480 (int or non)	1280x1024 (non)	1280x1024 (non) 2048x1440 (int)	1024x1024 (int or non)
Multiple Devices?	No	No	No	No	No	Yes	No	?	Yes	Yes
Video Standard	NTSC	NTSC	NTSC/ PAL	NTSC/ PAL	NTSC/ PAL	NTSC/ PAL	NTSC/ PAL	NTSC/ PAL	NTSC/ PAL	NTSC/ PAL
Toaster Friendly?	Yes	NA	No	No	No	Yes	No	Yes	Yes	Yes
Deinterlacer Friendly?	Yes	Partial (2)	Yes	Yes	Yes	Yes	Includes-deinterlacer	Yes	Yes	Yes
Video Digitizer?	No	Frame-grabber	Slow-scan	No	No	No	RGB video only	No	No	Yes

Notes:

(1) Separately available RGB adapter enables use with a genlock.

(2) The Toaster only works with deinterlacers that do not use the video slot.



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adapter.) IV-24 is unique in its ability to output 768x480-pixel, 16-million-color graphics as composite video, separated composite, 15-KHz RGB, and 31-KHz (deinterlaced) RGB, as well as to input both composite and RGB video.

To top it all off, IV-24 is the first Amiga board to offer picture-in-picture video capabilities, which require a host of tricky connections. The board has a standard 15-pin VGA output for monitors such as the Commodore 1950 (you can also connect to a 1084, but only via an unusual 15-9 pin adapter), plus normal RCA-type plugs for video output and for the genlock input. Currently, you must provide an RGB picture to use the board's picture-in-picture and framegrabbing capabilities; however, Great Valley Products is working on an adapter that will let you use composite video.

The software provided with IV-24 includes a control program to activate the board's various modes, a picture-in-picture program, a framegrabbing program, and a display program. Several applications are also provided, such as a version of Macro Paint (still in prerelease form at the time of this writing), and cut-down versions of Great Valley's **Scala** presentation package and ***Octree Software***'s **Caligari 3-D** rendering and animation package. ADPro 2 includes a display module for the IV-24, as well.

340X0 Boards

The final category of enhanced display boards is built around the powerful family of Texas Instruments (TI) graphics chips—the 34010 and the 34020. These chips are actually independent graphics processors, with their own display memory and instruction sets. The main purpose of the 34010 boards is to provide hi-res displays (up to 1280×1024) with 256 colors (from a palette of up to 16 million). The 34020 boards produce 16 million colors at the same resolutions.

Because the output of these boards is completely programmable, they can be used with almost any type of computer monitor, from the 1084 right up to the VGA, super-VGA, and high-resolution CAD monitors. By increasing the vertical refresh rate to 70 Hz or higher, these boards can provide hi-res interlaced displays on inexpensive monitors.

The enhanced pixel resolutions of the boards pose a different software support problem than that faced by enhanced color boards. While you can effectively use the latter to display screens of static graphics created with various Amiga art programs, the TI boards are designed for use with applications such as desktop publishing and CAD. Unfortunately, any application program that uses the normal Amiga display has to be completely rewritten to use such a display.

To make this process easier, Progressive Peripherals & Software and Digital Micronics have joined forces to produce the SAGE library, which will provide applications with a standard set of system calls that will work with any TI-based display board. Eventually, this may create a large body of software for these boards, but applications are bound to be scarce for the time being.

A2410

The first of this new generation of displays is the 34010-based **A2410** (also known as the University of Lowell board) from ***Commodore***. Although Commodore began shipping A2410 boards to dealers in mid-1991, they were not accompanied by any application software or documentation. At present, Commodore is positioning the A2410 mainly as a color XWindows display for Unix, and will bundle it with some Unix systems.

Although the Lowell development group provided Commodore with some software that can use the board under AmigaDOS, Commodore has not seen fit to include it with board shipments. Currently, only AD Pro 2 has an output module that can send pictures to this board under AmigaDOS.

Resolver

Digital Micronics' **Resolver** board is similar to the A2410. At this time, it uses preliminary software that lets you display IFF images with the board and set any of its programmable output modes, ranging from 640x400 to 2048x1440 interlaced, and from 640x400 to 1280x1024 noninterlaced. The software also provides for multiple boards. Although not much other software is yet available for the Resolver, DMI is helping a number of applications developers port their products to the board; the company is also working on Unix support for the Resolver.

Rambrandt

As impressive as the 34010 boards are, it is the 34020 boards that represent the ultimate in high-end graphics power. ***Progressive Peripherals & Software*** is putting the finishing touches on its 34020-based **Rambrandt** board, which features a 40-MHz 34020 with a 34082 math/graphics coprocessor, 8MB of video RAM, and 8MB of DRAM for programs. Some of the advanced features of this board include real-time 3-D graphics rendering, video input and output, picture-in-picture capabilities, digital video effects, and real-time image processing.

Basically, Rambrandt has all the capabilities of the IV-24 in 1024×1024 resolution, plus a super-fast math chip. Such power does not come cheap, however—the base price for Rambrandt is $3995. PP&S has not yet decided exactly what software will come bundled with its board. And PP&S is not the only company interested in 34020 boards: Digital Micronics has announced that it, too, is working on such a board.

A Standard Future?

Until Commodore comes up with a version of AmigaDOS that supports device-independent graphics, there can be no "standard" enhanced display for the Amiga that will run current software with no changes on new displays. Fortunately, even without such a standard, inventive developers have come up with useful solutions to the need for higher-quality graphics on the Amiga. By studying the features and requirements of the devices described above, you should be able to find one that moves your display capabilities one step closer to the state of the art. ■

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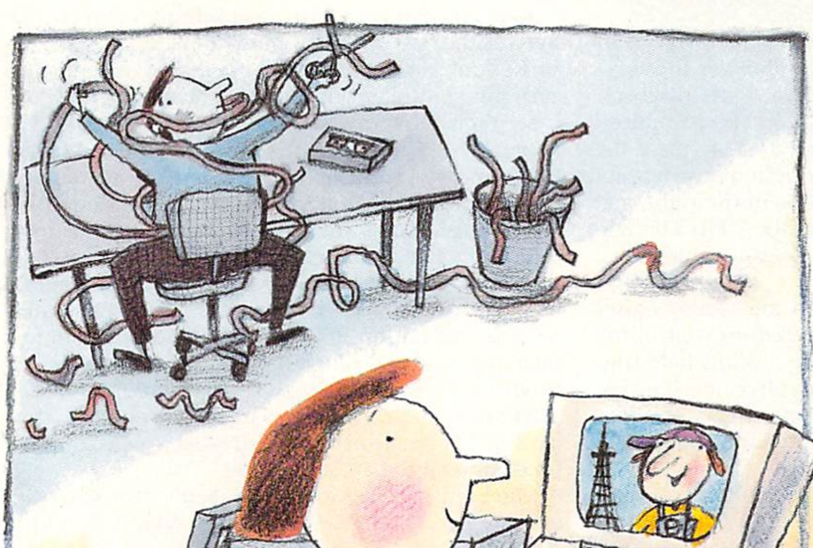
Digital Splice

Editing controllers have made studio-quality video-tape editing relatively affordable for the desktop videographer. Here's a look at how four such Amiga-based packages do it.

By Wayland Strickland

The home moviemaker sitting in his basement editing 8mm film is a thing of the past. Amiga desktop videographers aren't sitting amidst the debris of their own little "cutting room floors" using manual splicers that often utilize tape or glue to effect "in" or "out" edit points. Sophisticated editing controllers are bringing professional-level, video-tape-editing capabilities to the desktop-video studio, making it easier than ever to assemble scenes scattered across "field" or "source" videotapes into one final copy.

The price of editing controllers ranges from hundreds to thousands of dollars, and each unit's features usually fit the needs of a particular type of video production—professional, industrial, or consumer/home-based. We will examine the top editing controllers in each of these categories. These products include ***RGB Computer & Video***'s **AmiLink Multi-Media Video Production Editor**, ***Future-Video Products***' **EditLink 2000 Automatic Video Editing Controller**, ***Interactive MicroSystems'*** **MediaPhile Desktop Video System**, and ***Gold Disk***'s **VideoDirector**. To help you choose the one that suits your desktop-video-editing studio, we will discuss the controllers' capabilities to enter "in" (start) and "out" (stop) points, to save and load edit-decision lists (programs that keep track of the editing process), and to convert available formats (such as FutureVideo to CMX). Finally, we will evaluate each product's frame accuracy.



AmiLink: A "Professional" Gem

Designed primarily for professional video-editing applications, ***RGB Computer & Video***'s **AmiLink** is the most expensive of the four controllers. The "cuts-only" version is available for $4380 (serial-control VTRs) and $5780 (parallel-control VTRs); the "A/B-Roll" system prices range from $5994 (serial) to $8094 (parallel). (RGB, however, has recently introduced a consumer/industrial series of controllers. The **AmiLink/CI** systems range in price from $995 to $1995. The company also plans to intro- ►

ILLUSTRATED BY G. BRIAN KARAS

duce a very low-end version, **AmiLink, Jr.**, sometime early in 1992. Prices are set to start at $199.95.)

Based on VideoMedia's V-Lan hardware, the AmiLink professional system can control any combination of up to 32 serial or parallel professional/industrial video recorders—from D-2 to one-inch, BetaCam SP to MII, and ¾-inch SP to SVHS. In the near future, AmiLink will support the consumer Control L format used with Hi8mm and ED-Beta. These additions will make AmiLink even more versatile as a multiformat editing system.

The V-Lan hardware supplied with AmiLink consists of a small, rectangular box called the V-Lan transmitter. This unit connects to the Amiga via a 25-pin to 15-pin serial cable. The V-Lan transmitter has inputs for reference blackburst, as well as two BNCs (British Naval Connectors) for communicating with the V-Lan receivers.

Each of your video recorders requires a V-Lan receiver. This device has two inputs; one for time code (SMPTE/LTC), and the other (a set of two BNC connectors) for receiving information from the transmitter and looping it to the next unit. The front of each V-Lan box sports two LEDs; one indicates that the unit is running, while the other signifies communication among the transmitter and the receivers.

You can configure AmiLink to either a cuts-only or A/B-roll editing system. This product can control an external switcher (to trigger fades, dissolves, and so forth) through multiple GPI (General Purpose Interface) commands. (These commands are really just triggers, or on/off pulses.) With AmiLink/VT (a $250 software upgrade) you can even control NewTek's Video Toaster through ARexx, the interprocess command language that allows supporting programs to work with one another. You enter all commands through either the mouse or the keyboard. Those accustomed to working with the CMX professional editing system will feel at home using the keyboard because the layout is similar.

AmiLink lets you perform split audio/video edits, as well as standard video-only and audio-channel-one or -two insert edits (up to four channels on those recorders so equipped). You control the VTRs' playback, fast-forward, rewind, pause, jog, and record options from within the AmiLink software. You can place the VTRs into shuttle by pressing the right mouse button. By moving the mouse to the left or to the right, you can alter direction and/or speed of the VTR. This feature is one reason AmiLink excels as a professional editing system.

AmiLink is fully integrated into the Video Toaster system, permitting the editing system to control the Toaster's switcher functions. These tasks include triggering the Take button to perform cuts, controlling the Fader bar to achieve dissolve or wipe effects, recalling the character-generation pages, and retrieving Framestore images from disk.

The edit-decision list compiled by AmiLink contains all information pertinent to the edit, including the type of edit (cut, dissolve, and so on), start and end locations for each source and the recorder itself, notes and titles, and GPI triggering information. The edit-decision list is indispensable when performing match-frame edits, which AmiLink executes admirably. (Match-frame editing is a method of A/B-roll editing in which you cut into a scene on your record machine with the same frame on the source deck from which the scene came.) You can cut and paste any information in the edit-decision list from one edit to the next, much like a word processor's editing operations. AmiLink is compatible with other professional editing formats, such as MicroIllusions' CMX 3600 and EDLP.

I found AmiLink's editing accuracy using control-track pulses to be consistently within one to two frames per edit. With SMPTE time code, all edits were frame accurate, with no variation.

EditLink 2000: An "Industrial" Giant

If AmiLink's price makes you pass it by, you may want to take a look at ***FutureVideo***'s **EditLink 2000**—a topnotch editing controller in the industrial video-production category. EditLink 2000 prices with software included range from $995 (without time code) to $1695 (with time code).

This product is an automatic editing controller capable of either assemble or insert editing (if the record VTR is so designed). (Assemble editing is the process whereby the control track is broken whenever you stop the recorder. Insert editing is a method in which you replace the video or audio separately without disturbing the control track on the videotape.)

The EditLink 2000 controller consists of a small, generic-looking rectangular box with five connecting ports on the back of the device that include serial-port connection to the host computer, time-code input (SMPTE/LTC and RC 8mm), an edit-control output jack (similar to a GPI trigger), recorder VTR 7-pin connection, and player VTR 7-pin connection. The 7-pin VTR connectors can control VTRs with Control L or LANC inputs. Panasonic brand VTRs with 5-pin edit connectors require a special cable supplied by FutureVideo.

You can perform interformat editing between ED-Beta, Hi8mm, regular Beta and 8mm, SVHS and VHS VCRs, and camcorders. EditLink 2000 is essentially a cuts-only controller, but you can simulate A/B-roll editing either by controlling the second playback VCR manually, or by making the editor trigger the B-player VCR through the ECO (GPI). (You can use the latter method only if the unit has a synchroedit connector.)

Although EditLink 2000 is capable of reading SMPTE (nondrop frame only) and 8mm RC time code, the unit is incapable of creating this code; you therefore need an external time-code generator. To operate without time code, EditLink 2000 uses control-track information provided through the Control L connector. (A control track is a series of pulses that an editor or tape machine reads and counts to roughly keep track of its location.) For more accurate and reliable edits, though, I recommend SMPTE time code.

The EditLink 2000 software (called EDL 1000) is extremely easy to use and supports NewTek's Video Toaster through a GPI trigger. The program executes and displays a screen full of blank edits. As edits are performed, the screen stores the information. You can easily select any EDL 1000 function by choosing from a list of menu items at the bottom of the screen. These options include effecting specific "in" and "out" points, selecting types of edits, loading and savings EDLs, and calling up the on-line help screen.

One of the software's most interesting features is that you control VCR transport by using the Shift key and the keypad area numbers. Pressing SHIFT-4, for example, rewinds the VCR. Pressing SHIFT-6 fast forwards the unit.

Editing accuracy with Control L's control-track information provided two to four frames per edit. Using control track on the AG 1960 Panasonic VCR, I increased the accuracy to two frames per record per edit. Using the same VCR, I increased editing accuracy to one frame per edit with SMPTE time code.

MediaPhile: Wide "Consumer" Appeal

If the first two packages offer a bit more than you need (or can afford), ***Interactive MicroSystems'* MediaPhile Desktop Video System**, a home-studio editing controller, may be just the thing for you. (Interactive markets the MediaPhile product line in a wide range of offerings. The Desktop Video System software systems start at $395. Interactive also offers all kinds of other hardware and software combinations, from just the infrared control unit to entire systems that include video-tape recorders and even Amiga computer systems.)

The MediaPhile Desktop Video System editing controller is a collection of programs that work together or independently, depending on your system's requirements. MediaPhile can control a large array of both consumer and industrial videotape recorders, laser discs, CD players, and so on. Instead of using the traditional method of running a cable from the computer to the source and playback VTR, this controller gives you the option of storing the infrared remote commands from a remote-control unit and replaying them to control the VTR for editing.

> Editing controllers make the task of editing at home, office, or studio much easier—and more affordable—than it has ever been before.

MediaPhile contains prestored on-disk commands for many of the popular VTR models available today. (All commands necessary to control my Sony EDV-9500 ED Beta Editor, for example, were already stored on disk.) For those VTRs that are not listed, such as the Panasonic PV 8500 VHS VCR, storing the commands from the remote is simple. Given the number of different VTR models, switchers, and the like available today, you are bound to find one set of commands that functions with your particular equipment. MediaPhile also comes with an index that lists all applicable makes and models of video equipment from manufacturers such as JVC, Panasonic, Canon, Sony, and Emerson.

Although infrared control works reasonably well, exact placement of the transmitter is essential to the VCR receiving the commands. When using two or more VCRs, any placement inaccuracies make the VCRs either start at different times or not at all. In addition to this problem, if you use two or more identical VCR models, both machines try to perform the same function. Some VCRs such as Sony models include a switch that lets you make use of an alternate set of codes to control the VCR. In such cases, the disk also includes this alternate set.

Only high-end SVHS, ED-Beta, or Hi8mm model VCRs provide accurate tape-location information. If you have a lower-quality VCR, MediaPhile handles this problem either by reading SMPTE time code from the audio track of both the playback and record tapes to locate tape position, or by utilizing a "counter sense" cable that attaches to the VCR's motherboard and monitors the electronic pulses from the VCR's reel motor. The cable then relays this information back to the Amiga via the MediaPhile 2.0P or S controller that extends from the serial port.

MediaPhile's software multitasks with most other Amiga graphics and animation software, such as Electronic Arts' DeluxePaint, Byte by Byte's Sculpt Animate 4-D, and MicroIllusions' Photon Paint (and its successor, Oxxi's SpectraColor). This versatility lets you perform animation on recorders equipped to do so. MediaPhile also can trigger remote devices such as external switchers. A feature unique to this package is a separate program called "TC-Gen," which controls the audio output of the Amiga and generates SMPTE/EBU time code in both drop-frame and nondrop-frame versions. (When I used TC-Gen, however, it had some problems generating time code. My time-code reader could not read the TC-Gen time code consistently.)

Editing accuracy depends on how the system is laid out or wired. The standard 2.0P controller (infrared, only) exhibited accuracy to within three to fifteen frames per edit. With the control-track sense pulses and/or the Control L input provided with the 2.0S controller, I increased editing accuracy to within two to three frames per edit. Using SMPTE time code, I increased frame accuracy to within one to two frames per edit.

VideoDirector: A "Consumer" Bargain

Not to be outdone by MediaPhile, ***Gold Disk*'s VideoDirector** ($199.95) is also a topnotch home-studio editing controller. This package includes two cables. One attaches to the second mouse port and has a nine-pin D connector on one end and a nine-pin D connector housing a "receive" and "transmit" set of LEDs on the other. This "mouse" cable receives and stores the commands from the on-disk remote-control units, so that the program can transmit those commands to the VCRs later. The second cable attaches to the Amiga's serial port and has a DB 25-pin connector on one end and a 2.5mm phono-plug connector on the other. The serial-port cable is for controlling a VCR with a Control L serial port.

The VideoDirector software consists of two programs. The first, TrainRemote, records the commands from the remote-control unit of the VCR by displaying a screen with large icon representations of remote-control ►

buttons, such as play, stop, rewind, fast forward, and so on. When you "press" an on-screen button along with its counterpart on the VCR remote, the computer records this information.

The second program, VideoDirector, is the actual editing program; it contains only the basic functions required for cuts-only editing. VideoDirector primarily performs assemble edits. And unlike the other three products, VideoDirector does not support the European PAL standard. (All four support NTSC, though.) At its low price, however, VideoDirector represents good value as a consumer-level video-editing system.

I tested a beta version of this project, so only one Control L cable was available. Although this made testing its automatic editing functions impossible, I connected the single Control L cable to the recorder VCR and infrared-controlled the playback VCR without counter information. In this configuration, I obtained acceptable results. In controlling the single VCR using the Control L cable, editing accuracy was within three to five frames per edit.

One last arrival in the consumer-level category came my way in beta form as I was finishing this article. Although it is not slated for release until the end of the first quarter of 1992, it deserves a brief mention here. ***CyberCall***'s **CyberEdit** is a cuts-only video-editing program designed for use with Future-Video's EditLink 2000 controller as a way of communicating with the VCRs. The software is capable of performing both assemble and audio- or video-insert edits, in addition to reading SMPTE time code. CyberEdit is ARexx compatible and can talk to, and be controlled by, AmigaVision and other ARexx-compatible programs.

Another unique ability of this software is that while the editor is performing an automated edit sequence, the user may make changes—such as unperformed edits—elsewhere in the edit-decision list. While this was a beta-test version, with not all functions working properly—if at all—CyberEdit demonstrated promising signs as a viable contender in the Amiga consumer-level editing market.

In traditional editing studios, videographers needed a dedicated computer to synchronize the copying process; but now, thanks to the four products covered here (and others like them), you can set up your Amiga to do this work. Editing controllers make the task of editing at home, office, or studio much easier—and more affordable—than it has ever been before. ■

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Coats of Many Colors

Paint packages span a rainbow of color possibilities—from 32 to 16 million colors in a myriad of display options. Here's a roundup of what's available to 2-D animators in the way of Amiga paint software.

By Geoffrey Williams

Painting software programs have evolved steadily since Commodore introduced the first Amiga paint program, Graphicraft, with the Amiga 1000 several years ago. In a move to compensate for Graphicraft's limited features, Electronic Arts soon released DeluxePaint to fill the void. It became an instant hit and established the criteria by which subsequent Amiga paint programs would be judged. Choosing a paint program became somewhat more involved later on, as more paint packages came on the market, but smart shoppers still continued to compare all potential purchases to the DeluxePaint standard.

The situation is quite different today. Graphics artists now have an impressive range of options to help enhance their creative potential. From feature-laden software programs to bundled packages that combine applications with hardware devices, the choices are nearly limitless. To help you sort out your options, we'll take a look at programs in each of the following categories: 32/64 colors, HAM mode, hardware color enhancement (DCTV, HAM-E, Video Toaster), and 24-bit display (Firecracker 24, Impact Vision 24). We'll focus on what makes each program unique and highlight the special features that give it an advantage over the others.



32/64 Colors

WHAT SEPARATES SOME paint programs from others is the number of colors you can use in a picture. Standard Amiga-mode paint programs offer 32 colors in lo-res or 16 colors in hi-res. Some also allow you to use Halfbrite mode, which provides you with an additional 32 colors in lo-res; these colors, though, are half the intensity of the other 32. Most paint programs, especially the 32/64 color ones, also have animation capabilities; ironically enough, these features make seemingly similar paint programs unique. Let's put the spotlight on two stars in the 32/64-color category—**Graphics Workshop** ($99.95, ***Holosoft Technologies***) and **The Disney Animation Studio** ($129, ***Walt Disney Computer Software***). ►

ILLUSTRATED BY SANDRA FILIPPUCCI

Graphics Workshop: Packed with Power

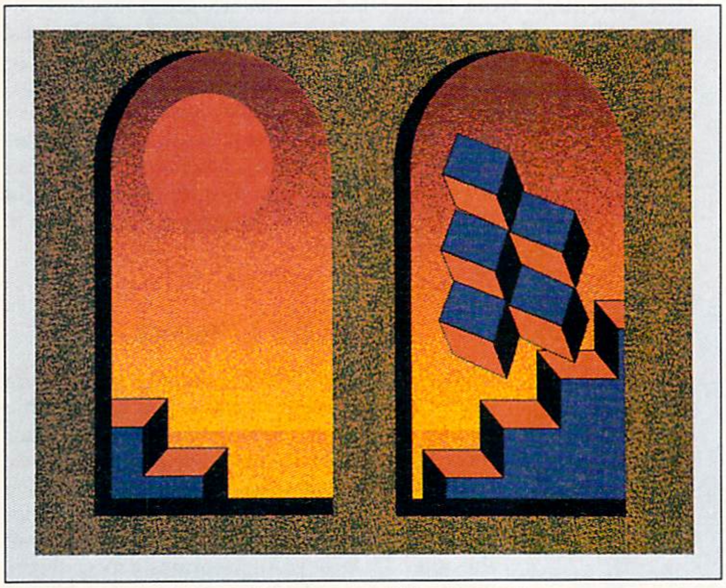
While the documentation for **Graphics Workshop** is fairly lean, a lot of power is packed into this program. Similar to those in DeluxePaint III, this program's drawing tools give you excellent control over the airbrush, let you select the number of sides in a polygon, and help you create true four-point Bezier curves with adjustable accuracy.

The program also features some simple, built-in image-processing options for performing edge detection to create line art and for converting to gray scale and black and white. Also, Graphics Workshop can grab screens from other programs and load them into the paint program directly.

The brush capabilities of Graphics Workshop are strong. Besides the traditional brush wraps, the program sports several unusual ones, including ripple, which wraps a brush on a wave, and filter, which purifies individual brush colors. Your brushes can have adjustable drop shadows, and you can activate up to ten brushes at once. You can even turn a brush into an object—then after you stamp it down, you can move it, edit it, or use it as a mask.

If you want to break the standard color barrier, this program is a good choice. Although it is limited technically to a maximum of 64 colors in Halfbrite mode, you can create up to 20 horizontal areas on screen, each with its own palette. The program also can dither two colors together automatically to create an apparent third color. And when you create animations, each frame can have its own color palette. The ANIM IFF Opcode 5 standard supports this option, but DeluxePaint does not.

Besides the normal ANIM capabilities, Graphics Workshop also has its own proprietary animation format that moves objects in real time rather than through the ANIM page-flipping technique. (You can have up to ten objects in motion at once.) Creating complex animations in this fashion, you use very little memory and disk space. For standard animations, draw editable motion paths for brushes and animate several brushes simultaneously.



Bruce Elliott used DPaint III to create "Five Cubes."

The Disney Animation Studio: For Animators, Not Painters

Although **The Disney Animation Studio** is a great animation tool, compared to other packages its paint features are extremely weak. About all the Ink & Paint module can do is fill shapes with color (but it does this faster than any program I have seen!). The Animation Studio can fill a full screen in an instant. It can also fill with automatically generated dithered colors, but you will find no fancy gradient fills or brush manipulations. (You cannot even pick up a colored brush.) Ink & Paint is designed simply to fill the line drawings you create in the drawing module—and not much else.

Speaking of drawing, to do so you must use the Pencil Test module. It includes all the standard drawing tools, as well as rotate, resize, and flip-brush manipulation. You even can remove isolated pixels—a handy feature for cleaning up digitized drawings. Of course, everything in this module is strictly black and white.

One of the program's best features is an NTSC filter, which turns NTSC (National Television Standards Committee) colors that are illegal into acceptable shades that work with video. Also, you can use a stencil to change the color palette on each frame, but that is about it.

Calling this product a paint program does The Animation Studio a disservice—it does not stack up well in this category. This program is designed and optimized as a cel animation tool for animators working with the traditional frame-by-frame approach (there is no move requester), and there it excels. It has many unique animating features, such as an exposure sheet that plays the frames of the animation in any order (even repeating) and synchronizes sound effects to specific frames. Its onion-skin feature is much better than DeluxePaint IV's. Loading and saving animations in the CFast format is just that—fast. Traditional animators will find this program enormously useful, but you still will want a full paint package.

HAM Mode

THE NEXT STEP up in terms of the number of colors you have at your disposal is HAM (Hold-and-Modify) mode. Although this technology lets you display any or all of the Amiga's 4096 available colors simultaneously on screen, you will discover other limitations. Each pixel depends on the pixel to the left to determine its color. If you are shifting your colors dramatically, such as going from black to white, achieving the color you want may take up to three pixels of color transition. If these colors do not blend smoothly or cleanly, you are left with what are known as "fringe colors." All the HAM program manuals explain how to minimize this fringing effect. When you go to video, the fringing can work as antialiasing to smooth out the picture and reduce jaggies. Let's see how **DeluxePaint IV** ($149.95, ***Electronic Arts***), **SpectraColor** ($99.95, ***Oxxi/BazboSoft***), **Digi-Paint 3**

($99.95, *NewTek*), and **Image Master** ($199.95, *Black Belt Systems*) stack up.

DeluxePaint IV: "Four" Has More

DeluxePaint has been on the top of the heap since its inception, and this new version ensures that it will stay there. All Amiga artists should have **DeluxePaint IV** as a matter of course. It has a wonderfully powerful and intuitive interface, and, more importantly, it lets you use the right mouse button to draw with the background color and to select alternate icon options. This capability, which is not possible with a single mouse button, makes drawing much faster and easier. (It is one of the reasons I prefer the Amiga over the Mac as a painting tool.)

The palette capabilities include several new and significant features. You can create additional colors by mixing existing ones. You can choose colors from your entire set and use them as ranges to create almost unlimited color-cycling and gradients. You can cycle a single color register through many colors, and you can use colors that are not in your palette when you create a color-cycling range.

Two of the most important additions to this version, though, are Metamorph, which lets you make an animbrush of one brush transforming into another (use the Spare Brush feature), and Antialias, which smooths out the jaggies automatically when you draw. Of course, everything now works in HAM mode.

SpectraColor: Strong HAM Suit

SpectraColor is an update of MicroIllusions' Photon Paint. While it may seem out of the running with the release of DeluxePaint IV, it has a lot of features DeluxePaint lacks and still seems to take better advantage of HAM capabilities.

You can cut out brushes freehand. Brush wrapping lets you enclose such shapes as cones and cubes with adjustable lighting, shading, and backlighting. You can even define a 3-D surface for brush maps. You can draw freehand animation paths and generate animations using any of the brush-transformation options. You can copy the background automatically to each new frame while the program generates the animation.

Digi-Paint 3: Great Effects, But No Paint Punch

Other reviewers have said that if you have only one paint program, **Digi-Paint 3** should be it. I could not disagree more. Digi-Paint is a great HAM-only, special-effects and editing program, but its lack of many basic painting features puts it out of the running as a serious paint package. It has no flood-fill tool, no vanishing-point perspective, no custom-brush painting, no stencil, and no animation capabilities.

This is not to say that it is a bad program—far from it. With outstanding and intuitive control over transparency, warping, and texture mapping, it has one of the best interfaces around. Digi-Paint introduced the redo feature, which lets you experiment with effects just by changing the parameters. You can draw a filled circle, change the transparency, click redo, and the program redraws it for you with the new setting. Digi-Paint was also the first paint program with fully implemented ARexx control. In addition, it lets you do amazing things with rubthru, the technique in which you combine all sorts of effects as you reveal areas of the alternate screen. Digi-Paint 3 even comes with Transfer 24, an image-processing program.

Digi-Paint 3 performs great effects, and it is a perfect complement to a digitizer. If you want to create art from scratch, though, you may want an additional paint package.

Image Master: Image Processing Plus Paint

Although it is more of an image processor, **Image Master** has a full range of paint capabilities. It is a 24-bit program that keeps track of 24-bit data internally, but the highest quality it can display is a dithered HAM mode. Image Master's palette is pretty impressive in its use of dithering and other tricks to make many more colors available from which to choose. When you do actually view the 24-bit pictures in DCTV or HAM-E, or with a 24-bit display card, they look great.

(For more information about Image Master's features, see the discussion of Image Professional in the HAM-E section below.)

Hardware Color Enhancement

IF YOU WANT even more color, you need additional hardware. Both **DCTV** ($495, *Digital Creations*) and **HAM-E** ($299.95, *Black Belt Systems*) are external boxes that plug into the RGB port of your Amiga. Although the Amiga thinks it is displaying a normal Amiga picture or animation, there is extra information in the picture that the external boxes decode to render additional colors. The big advantage here is being able to animate these images at the same speed at which normal Amiga animations run.

DCTV renders the pictures as composite (normal NTSC television) images, while HAM-E passes them through as RGB images. Although both products offer palettes with millions of colors, the way they produce pictures, and the pictures themselves, are dramatically different. You need to see both to decide which one will work best for you.

The **Video Toaster** ($2495, *NewTek*) is an internal card that gives you enhanced color, as well as video capabilities. Although it has internal 24-bit features, it has only composite output, which cannot display the full 16 million colors because of the limits of the NTSC standard. There is a marked difference between its output and true 24-bit RGB output, so we are placing it in the hardware color-enhancement category.

DCTV Paint: A New Standard-Setter

Artists familiar with traditional painting techniques will find that **DCTV Paint** has the most "painterly" feel of all the Amiga programs. Its watercolor implementation is among the best I have seen, and many of its features simulate real-world painting techniques.

Unlike other paint programs, you cannot edit pixel by pixel. The program does not use pixels; instead, it is based on a waveform. This structure actually makes using the program more like working with paint. The ►

Magnify option does not even make the image look pixelized, so you can zoom in quite close and still see a recognizable picture.

Its air-brush tool is much more realistic than those found in other programs. You even can draw with brushes that run out of paint along the brush stroke. DCTV Paint was the first Amiga program to design a special area in which to mix colors. This section is just like a traditional artist's palette. Thanks to the additional colors, DCTV Paint's mixing area works much better than the one in DeluxePaint IV.

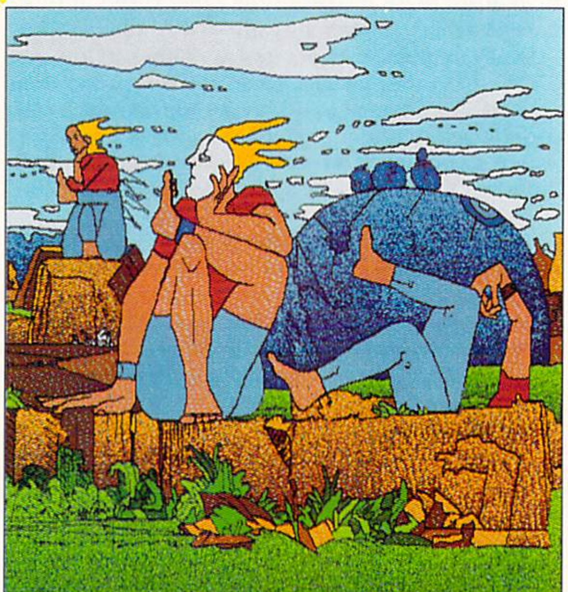
DCTV Paint features more gradient-fill options than any other paint program. Version 1.1 has even added a new one—Spiral. These fills are also very intuitive. After all, DCTV Paint introduced the concept of using control lines and other gradient factors to set direction. The program also started the trend of moving beads into place to set color ranges. This feature is much more impressive in DCTV Paint than in DeluxePaint, because you have more colors with which to work. Because you can combine different tools in a variety of ways, the number of options available could make you dizzy.

The new version also includes a much needed undo function and improved font-handling capabilities. In short, DCTV Paint sets the standard for enhanced-color programs, much as DeluxePaint set the standard for native Amiga-mode paint programs.

HAM-E Specials: Graphics Workshop and SpectraColor

Black Belt made a good move when it released HAM-E. The company made the source code and hardware specifications available to everyone. This step has paid off, because, unlike DCTV, other companies are able to develop products that work with the HAM-E display.

Both **Graphics Workshop** and **SpectraColor** are



"Down Under," a 16-color native Amiga imagebyBruce Elliott.

available in HAM-E versions. These applications are full-featured adaptations of the originals, except that with them you can display a lot more colors. Because both programs have powerful animation capabilities, you can create impressive animation easily and quickly. If you are considering buying Graphics Workshop or SpectraColor, you should think about spending the extra money to buy the HAM-E display box. After all, it is the least expensive enhanced-color hardware device on the market. Also, both these HAM-E versions are reasonably inexpensive; if you own SpectraColor already, you can upgrade to the HAM-E version for only $29.95. The Graphics Workshop for HAM-E does not have an upgrade policy, but it is only $60—$40 less than the standard version.

Image Professional: Packed with Features

Lest you be concerned that the HAM-E box does not come with paint software of its own, we had better set the record straight. In fact, it comes with one of the most powerful image-processing and paint packages available for the Amiga. Not only does **Image Professional** (the HAM-E version of Image Master) sport an absolutely stunning variety of image-processing and effects options, it also comes with a complete paint module that has a long list of features.

Although it is strictly a paint package without animation capabilities, it offers more than 15 drawing modes, including chroma and luma rubthru, antialiasing, and NTSC-conform. These drawing features also work as fill modes, and you can create brush warps and wraps—while maintaining control over hot spots, transparency, and color ranges. You even can add more colors automatically to smooth color spreads. And you can control all of the many features through ARexx.

Image Professional is the only paint program I know that supports Amiga fonts, ColorFonts, and Workbench 2.0 outline fonts. It is also the only paint program that can load and save all Amiga modes—GIF, HAM-E, DCTV, and JPEG. Still, because there are so many options in what is primarily an image-processing program, simple paint tasks may be more complex than you would like.

Black Belt also bundles a paint program, called, appropriately enough, **HAM-E Paint**. This product gives you a more traditional paint interface, sophisticated color-cycling capabilities, and animation capabilities—after a fact. You can render animations through ARexx, but they end up as individual screens that you must compile into an animation and play in other software. (You can, however, play both HAM-E and DCTV animations with any Amiga animation player.) If you want to do a lot of animation, though, you will be much happier with SpectraColor HAM-E or Graphics Workshop HAM-E.

Toaster Paint: The Good and the Bad

Essentially a version of Digi-Paint 3 with expanded color capabilities, **Toaster Paint** shares most of Digi-Paint's limitations as well as its exceptional features. The biggest problem, though, is that you paint on a HAM screen that is one-fourth the size of your picture. Even though you can scroll around smoothly, you must dump the image to the frame buffer to view it in its entirety. This takes a few seconds too many.

While Toaster Paint does have a flood-fill feature that Digi-Paint does not, I still cannot recommend the product for creating original artwork—you are basically work-

ing in HAM mode while looking at a limited portion of the screen. You can create gradient fills and effects that display hundreds of thousands of colors when rendered to the frame buffer, but you can see and paint with only 4096. It is not a real-time 24-bit paint program.

Toaster Paint, like Digi-Paint, supports only standard Amiga fonts. You cannot load Toaster fonts into Toaster Paint, which is unfortunate, because these are some ofthe best fonts around—especially the Toaster ColorFonts.

One irksome Toaster Paint quirk is the way it handles blacks. You can dump a stillstore into it and the blacks look fine, but the moment you try to paint on it, the blacks become washed out.

Toaster Paint may be fine for touching up grabbed frames or creating special effects, but I cannot see trying to use it as a true paint program. Many do, as it is all they have, but most of the people I know use DCTV Paint and then import their work back into the Toaster for display and manipulation.

24-Bit Painting

TO GET TRUE 24-bit color on the Amiga, you need additional hardware. With a 24-bit display, any pixel on the screen can be any one of over 16 million colors. This is the highest quality available, and it produces stunning pictures. It requires a lot of memory, though, and the pictures created are serious disk-space hogs, easily consuming more than a megabyte each. (It is not unusual for a photographic-quality super bitmap to be even seven or eight megabytes!) Because there is so much data to manipulate, purchasing an accelerator is a good idea.

Although many 24-bit boards have been announced or are shipping (see "Brave New Worlds of Color," p. 78, for a complete guide to enhanced-display devices, including 24-bit boards still under development), we will cover only two 24-bit paint packages here. (Other boards either were unavailable or did not include fully functional paint packages at the time of this writing.) Both **Firecracker 24** ($995, ***Impulse***) and **Impact Vision 24** ($2195, ***GVP***) come bundled with 24-bit paint programs.

Light24: Real-Time Paint, Unique Options

The Firecracker's **Light24** is an amazing paint program. Besides producing the best-quality images you will ever see on your 1084S monitor, thanks to Firecracker 24's overall design, it is also amazingly fast (for a 24-bit paint program, that is). It offers true, real-time paint, with instant feedback for most of the options—even on an unaccelerated machine.

The interface is a full screen of buttons that you toggle out of the way with the right mouse button. This marks a different approach, but you get used to it quickly. Light24 has the full range of features, such as 24-bit gradient fills, paintable brushes (although you see them in outline form), and such brush transformations as bend, tilt, size, and rotate. It has a filter, a fader, a blender, and a sponge (which picks up the current colors and lets you smear them around).

Although Light24 does not allow brush wraps, it has a brush feature that is unique. You can load an Imagine (Impulse) 3-D object, for example, and then scale it, rotate it, and set the perspective view in three dimensions. You can set a light source and its distance from the object, add a global brush for reflections, and then render it.

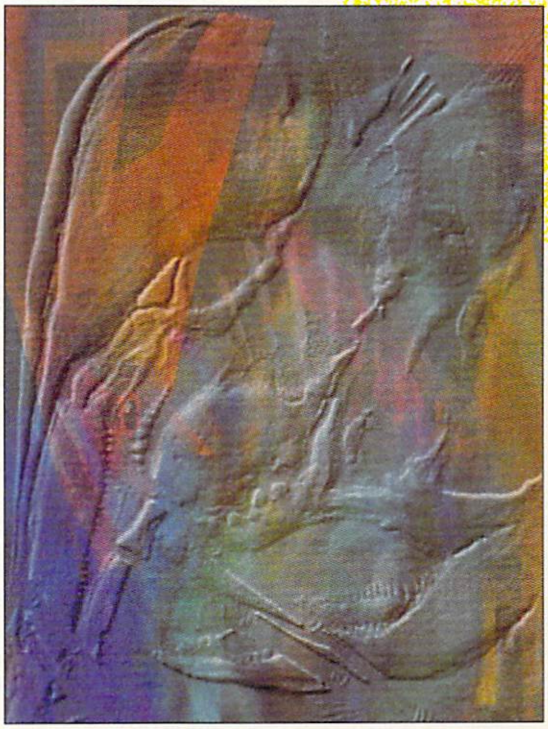
Another unique feature is direct support for the Epson ES300C. With the addition of a $50 cable, you can control scans directly from a control panel and scan directly into Light24.

By using the overscan area, you can display a 256-color palette that completely encircles the drawing space without obscuring it. You can select a color just by clicking on it. By clicking in one corner, you can toggle through eight 256-color palettes. You can adjust them all easily and save them to disk. You can create spreads simply by clicking in the top-left corner, then choosing the two colors between which you wish to spread. Also, you can toggle the palette off so that you can paint in the overscan area.

MacroPaint 24: 24-Bit Paint—With Limitations

Unlike Light24, Impact Vision's **MacroPaint 24** offers a more traditional tool strip along the bottom. It is not a real-time paint program, which means that when you draw a line, the program creates that line in a false color but then renders it in the selected color.

MacroPaint's cut-and-paste features take some getting used to. When you cut out a brush, it toggles to the paste mode, but you cannot see the outline of the brush to move it around unless you hold down the left mouse button. This commits you, however, because when you let go, the brush is stamped down. This presents a problem, as pasting becomes a slow process (it took over five seconds to paste a one-inch blue circle on an unaccelerated machine), and there ►



"Markings," by Joel Hagen, is an IFF image.

is no abort option. You cannot draw with a custom brush or do any warp or wrapping effects. There are several blending options with custom brushes—you can double or halve them with the y or x function and do rotations—but, basically, brush manipulation is limited.

The built-in brushes come in only three sizes, which restricts their use severely (especially as you cannot paint with custom brushes). The magnification is also limited—there are only two levels. Although MacroPaint has brush fills and rubthru, you cannot control how the brush fills (it is either tiled or cut off), and you cannot control the transparency of the edges in rubthru. All in all, these features are not all that useful. There is also no polygon tool.

MacroPaint 24 does, however, have some important features that many paint programs lack. You can set up a region of the screen to be flipped, sharpened, or smoothed. Also, you can create other effects in these regions, such as lightening and darkening, without affecting the rest of the picture.

MacroPaint 24 loads in Dynamic HAM, SHAM, and Caligari Rendition file formats. It also supports ARexx fully—there are four configurable ARexx macro buttons—and it supports Colorfonts, too.

In order to use this program, however, you really do need a fast accelerator; otherwise, it is just too slow to be practical. MacroPaint was also the least stable program I tested—strange things happened often—but this could be because I tested an early version. If your 24-bit painting needs are not too demanding, MacroPaint has all of the basic features and should work fine.

Image Master Firecracker: Image Professional Revisited

Black Belt's Image Master also is available in a Firecracker version. **Image Master Firecracker** ($199.95) provides the same paint capabilities described under the Image Professional HAM-E version, plus it offers a full range of image-processing features. Although it basically is the same as Image Professional, it adds a real-time color mixer for blending colors to create a new palette. You even can copy brushes to the mixer and use them to blend new colors.

Choosing among all the many Amiga paint programs is not easy. Try to determine what features you need the most, then search for the programs that best support those features. You probably will need more than one product to accomplish all you want to do. The standardization of file formats makes using multiple programs easy. Amiga paint programs have come a long way, and with so many choices, you are bound to find the packages that are right for you. ■

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Still in Sync?

Comparative Reviews of Ten Amiga Genlocks

Amiga video expert Joel Tessler picks up where he left off in AmigaWorld*'s first Video and Animation Special Issue to see which genlocks suit which applications.*

By Joel Tessler

All genlocks allow you to combine Amiga graphics with external video. But which is the best for your needs? That is a tough question, especially with the number of devices on the market today. To make things easier on you, we pulled out all the stops to test ten dedicated genlocks, evaluating their features, performance, and reliability.

Although genlocks have not gone through the kind of rapid evolution that some other video technologies have, there have been changes. Since our last roundup in the 1990 Video and Animation Special Issue ("Who's in Sync?," p. 54) some companies have adjusted prices, updated products, and introduced new players. So it is time to bring up the genlock discussion once again.

A few genlocks have not changed at all over this two-year period. Instead of referring you to a past issue for information on these devices, we chose to reprint the material here. You may note some other similarities to the past article, as well. In the product headings, I have noted which Amiga system(s)—A500, A2000-series, etc.—each genlock supports, and which broadcast-signal standard(s)—the American NTSC (National Television Standards Committee) or the European PAL—it allows.

I have also used the same conventions for evaluating the genlocks. As before, I've recommended each genlock for at least one of the following applications: Home, Industrial, or Broadcast video (noted by H, I, or B in the headings). These categories will give you an idea of whether a unit is appropriate for your needs.

To help determine which category each genlock was suited for, I used standard EIA (Electronic Industry Association) color bars to test the units on a waveform monitor for their handling of luminance, sync, and burst. I also tested them on a vectorscope for hue and color saturation. (See the sidebar "The Test Bench" for photographs of the test results, and an explanation of how to interpret the readings.)

I did not use these test results alone to determine the appropriateness of a genlock for an application, however. I also put each unit through its paces in real-world VHS, SVHS, and 3/4-inch edit systems (where the genlock interfaced to both a player and a recorder VCR). In each edit suite, I used Broadcast Titler (Inno-

Text continues on p. 100.

The Test Bench

To evaluate each genlock's handling of video signals, I took them to the "test bench." There, I ran their signals through both a vectorscope and a waveform monitor, both items of equipment routinely used in professional video studios.

A vectorscope tests a genlock's output of color saturation and phase (hue). The vectorscope display looks like a pie cut into eight pieces, six of which represent different colors. Within each slice is a large box (outlined in four corners), with a smaller box inside. If the line representing the signal falls within the smaller box, saturation is considered correct. If the signal falls outside the small box, but within the large box, saturation is acceptable (the nearer to the small box, the better). However, when the signal line lands outside the large box, as with the AmiGen, you have trouble.

A line runs from the center of the pie through the small box to the edge of the scope. The closer this line is to the edge of the pie, the greater the color's saturation level. The closer it is to the center of the circle, the lower the saturation. Ideally, this line should fall on the target in the small box. Oversaturation can, among other problems, cause "hot" video (blurry images with white edges) and "blooming" (curvature at the edges of the screen). Undersaturation, on the other hand, can cause color washout, as well as a total loss of color when you're making dubs. Finally, the lines connecting the chroma dots should be straight. Curved lines indicate poor differential gain, which causes sync problems.

Phase accuracy is determined by the distance of the signal line to the small box, in a clockwise or counter-clockwise direction. As with the tint control on your television set, the direction of the signal line's displacement indicates color shift. If the line is to the left of the small box, you will get a reddish tinge; to the right, green.

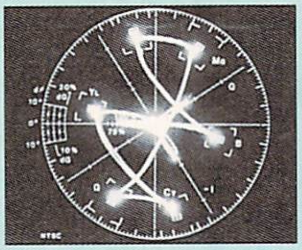
A waveform monitor provides readouts that test output of luminance and sync/burst. The luminance stairway's steps should be of equal size—the thinner the better. The top step, which represents the white peak, should be centered on the 100 IRE line. If it is higher than that, the signal is too hot. The bottom (or "pedestal") step, which shows the black level, should be centered on the dotted 7.5 IRE line. If the pedestal step is too low, you lose detail; if it is too high, blacks look gray andeverything is a bit washed out.

The sync/burst reading is the U-shaped signal flanked on both sides by zig-zag lines. Where the signal drops and flattens out, you should look for a clean, straight, horizontal line at –40 IRE. Any waviness or jiggling indicates ringing, which results in scan lines on your picture and noticeable degradation of the image. To the right, the signal enters a 3.58 MHz reference oscillation. The peaks of the oscillation should run between the +20 and –20 IRE lines. Deviation from this indicates a "rolling off" of the signal, and is manifested in a poor high-frequency reponse curve.

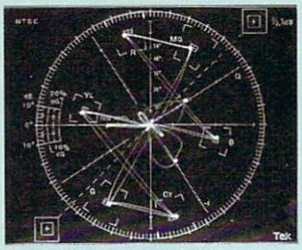
I would like to thank Lenny Cohen for his help in producing the waveform and vector photographs, and Wayde Klipper for the use of his Tectronics Video Lab. □

—JT

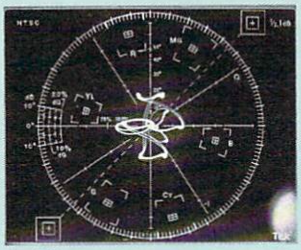
The vectorscope display.



A2300



Alter Image



AmiGen

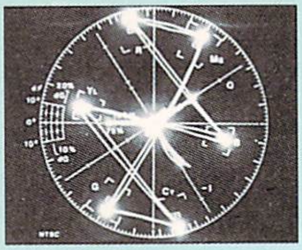
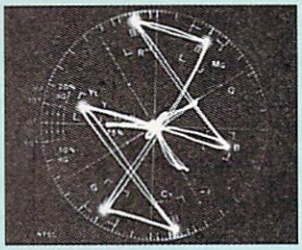


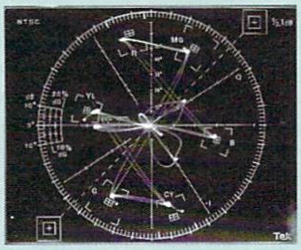
Image Master



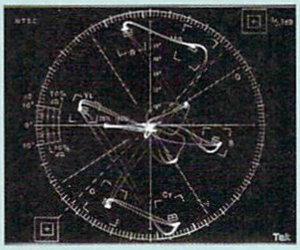
miniGEN



Omni-Gen



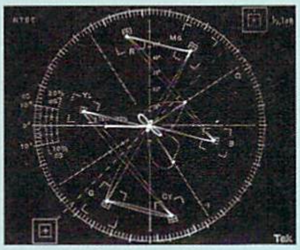
RocGen Plus



RM-2B

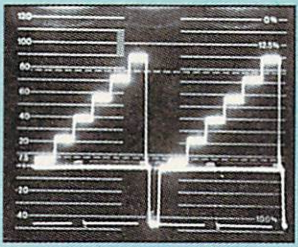


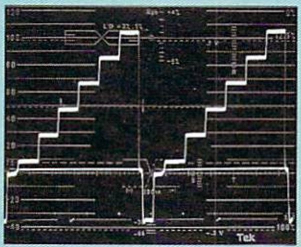
SuperGen

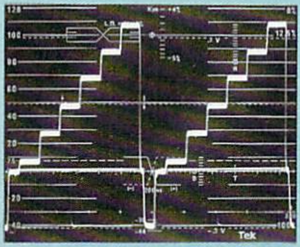


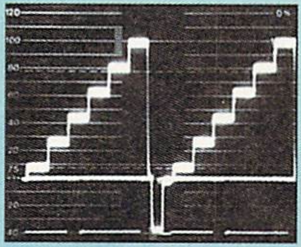
SuperGen 2000S

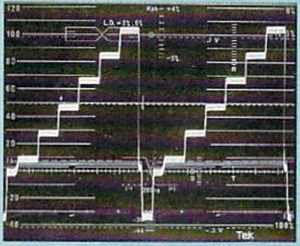
The waveform luminance display.

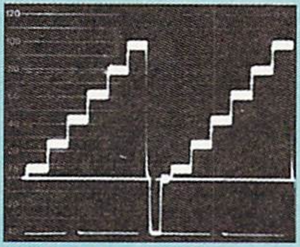

A2300

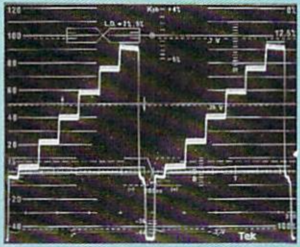

Alter Image

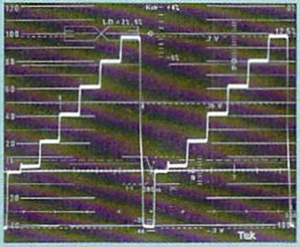

AmiGen

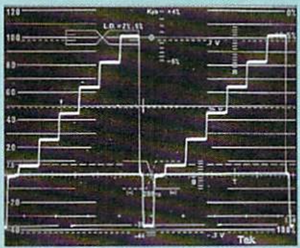

Image Master

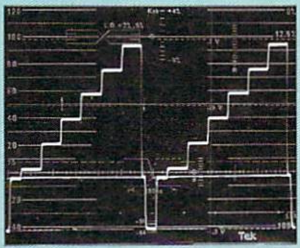

miniGEN


Omni-Gen

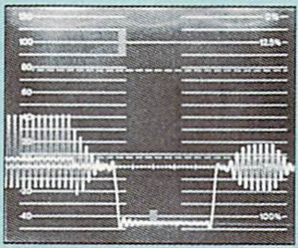

RocGen Plus

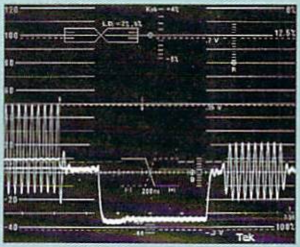

RM-2B

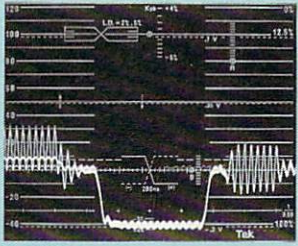

SuperGen

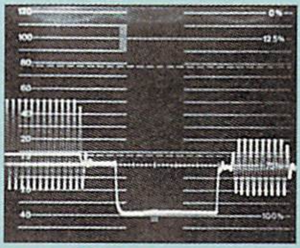

SuperGen-2000S

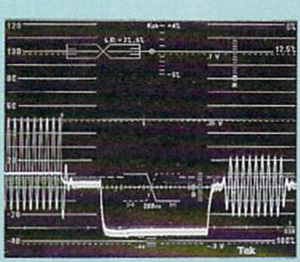
The waveform sync/burst display.

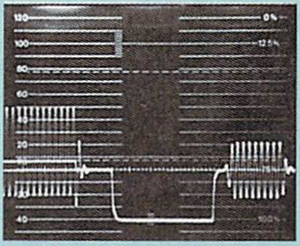

A2300

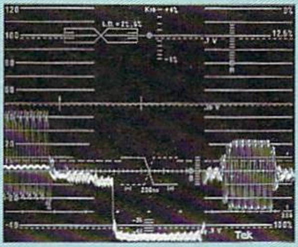

Alter Image

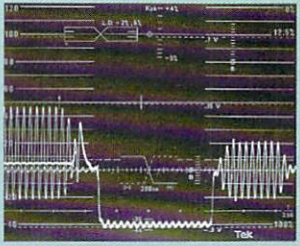

AmiGen

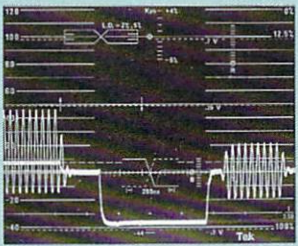

Image Master

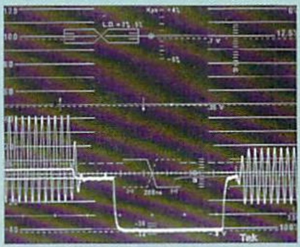

miniGEN


Omni-Gen


RocGen Plus


RM-2B


SuperGen


SuperGen-2000S

From p. 97.
Vision Technology) to see how well Amiga graphics held up over source video.

To give you a further indication of my opinions, I have given each unit an award based on its unique characteristics.

A23OO
Commodore Business Machines
$399
Recommended Use: H, I
System: A2000-series
Signal: NTSC, PAL

The A2300 installs into the video slot of an Amiga 2000: There are no dangling wires, power supply, or special boxes. Its ability to feed an external video signal (videotape, laser disc, video camera) directly to the RGB monitor in combination with RGB Amiga graphics makes it well suited to interactive video.

The A2300's problems became apparent when I tested it with the vectorscope and waveform monitor. The sync was too "hot," the luminance far too low, and the burst was completely fallen off and ringing. Running videotape through the A2300 and overlaying text produced acceptable results, but when I displayed a full graphics screen, signal instability proved overwhelming. The manual contains extensive documentation on internal adjustments and procedures, which just might correct some of these problems—but do not hold your breath. This genlock is suitable only for home use or for low-end interactive applications. Commodore gets the "Nice Try, but No Cigar" award for the A2300.

Alter Image
The Disc Company
$249.95
Recommended Use: H, I
System: Any
Signal: NTSC

The Alter Image, a moderately-priced unit, is an alternative for those who need a genlock, but not the high expense. The entire unit fits in the palm of your hand and plugs directly into the RGB port of your Amiga. The controls on the unit are simple—two RCA jacks for Video In and Out, and a three-way toggle switch for graphics, video, and mixed. One of the things I like best about this unit is its RGB loopthrough. This feature lets you leave the unit in the RGB port permanently—you do not need to unplug your RGB monitor every time you produce video.

This unit is not without problems, though. The toggle-switch controls are located on the unit, which means you must control the device from behind the computer. You can solve this inconvenience by running an extra RGB monitor cable between the computer and the genlock. In that way, you can use the unit in front of your Amiga on your desktop.

The Alter Image did rather well throughout the entire edit and on the "test bench." It exhibited a satisfactory chroma level, some ringing on the sync, and good-looking luminance. Because it performs well in all categories, Alter Image gets a "Best New Product" award.

AmiGen
Mimetics
$199.95
Recommended Use: H
System: Any
Signal: NTSC

The AmiGen still remains the most compact genlock for Amiga video applications. If you are always on the run, working on road shows and concerts, for instance, you will appreciate the unit's size. That and its RGB loopthrough—a real selling point—make the AmiGen appropriate for interactive mulitimedia applications. Unfortunately, however, the company has discontinued some features available in the older AmiGen, such as separate hue and level controls.

For video, the only connections you need to make are the RCA connectors for Video In and Video Out. Once you have run the accompanying Setlace software, AmiGen is ready to send a composite signal out to your VCR or monitor. Although the AmiGen does not have the capacity to fade or dissolve graphics and video, it overlays Amiga video graphics over incoming video signals automatically. Simply introduce a video signal into the AmiGen's video-input connector, and the genlock handles the routine without having to be told.

During the edit, some color bars displayed on the monitor looked quite washed out. It is hard to comprehend that this new unit is worse than the old one. The fact that it no longer includes a level or hue control made it difficult to look at when I tried to evaluate it on the waveform monitor and vectorscope. Once again, I give AmiGen the award for "Special Defects."

Image Master Pro
Neriki
$2195
Recommended Use: B, I
System: Any
Signal: NTSC, PAL

Neriki's Image Master has received high ratings from the broadcast press and the Amiga video community. Its design takes into account the needs of broadcast, direct-to-post, and high-end industrial facilities.

The Image Master comes in a 19-inch rack-mountable housing. An assortment of connectors on the rear panel allows for Video In with loopthrough and termination toggle, Composite Out, RGB Out, and separate Sync Out. There are also RGB Amiga connectors allowing for monitor loopthrough, and switches for 180-degree chroma phase, fine chroma phase, and power.

I am not clear as to why a rotary luminance keyer is provided for graphics control, but with it you can key in Amiga graphics. You can bypass the keyer, but doing so locks out the ability to perform dissolves except via a switcher or special software.

The Image Master's vectorscope readings were good, chroma saturation was a little high, phase was dead on, the stairway was solid, and the burst was clean. In editing, the Image Master performed well except for the one time it refused to accept a video-tape signal (which worked fine with the other genlocks).Perhaps the unit is finicky about the incoming signal quality.

At $2200, the lack of an internal sync generator and

dissolve faders has me slightly confused, but this genlock is worth considering—especially for PAL applications. The Image Master gets the "Quality Equals Cost" award for its high performance and equally high price.

miniGEN
Progressive Peripherals & Software
$229.95
Recommended Use: H, I
System: Any
Signal: NTSC

The miniGEN proves that "small is beautiful." Housed in a plastic case and sporting one RGB connector, a three-way toggle switch, and pair of female RCA plugs, this little jewel does not look like much—but it sure can perform (especially considering its price)!

In vectorscope and waveform tests, luma stairway looked good, the burst was hot, and the hue was right on. Color saturation was a bit high and the signal a little too hot, but in the edit suite, source footage looked good running through miniGEN, and titles held up well. Some colors, including red, were unstable, but by reducing the graphics' overall saturation with a paint program, I was able to achieve better results.

Although this unit will not produce the super-clean results of high-end genlocks, if you light your scenes carefully, your footage will have a cleaner signal. Also, I recommend using a composite display when working up the graphics for your edit. With composite mode, what you see is what you will get.

The miniGEN is not for broadcast applications, but for home and industrial video, it is fine. One sticking point with this genlock is its lack of an RGB loopthrough. The constant task of pulling the RGB monitor off and then putting it back on is at best inconvenient. The miniGEN gets the "Best Low-Cost Genlock Without RGB Loopthrough" award.

Omni-Gen 701
Omnicron Video
$1595
Recommended Use: B, I
System: Any
Signal: NTSC, PAL

Aimed squarely at broadcast, direct-to-post, and high-end industrial facilities, Omni-Gen is loaded with such features as an internal sync generator, separate Y-C for SVHS Out Only, comb filtering, and 360-degree subcarrier-phasing adjustments for the Amiga.

The Omni-Gen is packaged in a standard 19-inch rack mount, and its unique pull-off front panel allows for easy access to a variety of trim potentiometers and DIP switches. A separate remote-control box with keyfade, fade-black-to-program, key-on, program-video, and Amiga-video buttons is supplied.

When I first tried out the unit, I had a problem with horizontal stability. Omicron's technical-support representative suggested a slight adjustment. This took care of the problem; thereafter, Omni-Gen performed well in all tests. Graphics overlays were super clean, and the incoming video was totally unaffected by the Omni-Gen. Vectorscope readings were good, although chroma was a bit oversaturated.

The Omni-Gen's components are durable and of high quality; this genlock should be able to handle any broadcast studio configuration. Although SVHS is not fully implemented (SVHS inputs are not supplied), Omni-Gen is one of the finest Amiga broadcast genlocks available. Omni-Gen gets the "Heavy Duty Broadcast" award.

RocGen Plus RG310C
RocTec
$379
Recommended Use: H
System: Any
Signal: NTSC

RocTec, a new name in the Amiga community, recently released two Amiga genlocks. The RG310C, the company's top-of-the-line unit, has some very nice features, especially considering its price. One offering that you will not find on other genlocks in this price range is a separate key-out capability. This allows for keying directly through a video switcher.

The RG310C comes in a heavy-duty beige case sporting two LED indicators—one for power, the other for video—on the front panel. It also has two concentric knobs: one controlling the amount of Amiga graphics to be overlayed, and the other controlling video. You can preset these knobs from an overlay cut or dissolve in your Amiga graphics. Also, you can use both knobs manually on the fly.

On the back of the unit is a two-foot cable with a male 23-pin connector that plugs directly into the Amiga's RGB port. Also on the back are an RGB loopthrough and RCA Video-In, Video-Out, Video-Thru, and Key-In connectors, as well as an optional 12-volt dc power port. (I suspect the company included the latter option for A500 owners running low on power.)

Overall, the RG310C's edit performance was less than spectacular. The unit exhibited noticeable chroma-crawl artifacts in handling large, shadowless Broadcast Titler fonts. After I added a drop shadow, however, chroma crawl diminished significantly.

Unfortunately, the RG310C's signal is not suitable for industrial or broadcast use: It displayed a lot of ringing and noise in the chrominance (which could cause severe problems in a high-end environment), luminance, and sync.

Perhaps RocTec's next run of RG310Cs will be better. For now, though, I cannot recommend it. This genlock gets the award for "Unfinished Business."

RM-2B
Glenn Loc
$2200
Recommended Use: H, I
System: Any
Signal: NTSC

Glenn Loc's RM-2B is a 19-inch rack-mountable unit, loaded with more inputs and outputs than I have seen on any other genlock. But, I wonder, does anyone really need all those connectors? The front panel sports control knobs for Cable Delay, Keyer A/B Mix, Color Bar Stretch, brightness, contrast, color, and hue. In addition to these knobs, it includes two toggle switches, one for Key/Mix and the other for Bar Generator On/Off.

The rear of the unit houses 22 BNC connectors for ►

NTSC Out; Red, Green, and Blue Out; Red, Green, and Blue In (from the computer); Black Burst Out; 3.58 Out; Stript -Sync Out; -+ C Sync Out; Composite Video In; External 3.58 In; To Computer H Reset; V Reset; and Clock. The Sync Generator Out section has Burst Flag, Blanking, Sync, and Vertical and Horizontal Drive. There is also a Key In connector.

The RM-2B comes with a special cable that has a standard RGB connector on one side and seven individual BNC connectors on the other. You must plug these seven connectors into the back of the unit. After making all the connections, plug the power supply (a large black box with a special din connector) into the back of the unit. A video signal from a VCR is fed into the Composite Video In, and the NTSC Out is fed into the Video Input of a recording VCR; then this is fed into a monitor.

During the edit session, the RM-2B produced fairly clean graphics from the Amiga, but its video did not look normal. However, the ability to adjust the brightness, contrast, color, and hue separately gave me more flexibility in correcting video that appeared dark or low in color. On the test bench, the genlock showed distortion and uneven frequency response, among other things.

Although the architecture of this unit makes it very flexible, it must produce a better signal to qualify for industrial use. The RM02B gets the "Most Innies and Outies" award.

SuperGen
Digital Creations
$799
Recommended Use: I, B
System: Any
Signal: NTSC

Digital Creations was one of the first companies to consider the Amiga's operating system in the design of a genlock. The resulting SuperGen has become a standard for affordability and high performance, and it is no accident that other developers have designed products to support it specifically. The unit is simple to use: Just plug the SuperGen into your Amiga's RGB port and loop the RGB cable to the monitor. SuperGen has built-in faders for computer and video, with two separate video-overlay outputs, a key output, a video loop-through, some internal adjusters for fine tuning, and a notch filter switch to quiet shaky edges. I have used it a lot in professional settings with excellent results.

Vectorscope tests prove the quality of SuperGen. If you want to meet more than the minimum requirements for clean signals in industrial and broadcast settings without spending big bucks, give this genlock a shot. SuperGen gets the "Industry Standard" award.

SuperGen-2000S
Digital Creations
$1595
Recommended Use: B, I
System: A2000 series
Signal: NTSC

The 2000S was the first Amiga genlock to allow direct signal processing using a software-based multitasking control panel. The panel contains gadgets for adjusting a number of video parameters: color saturation, chroma phase, horizontal position, vertical delay, and RGB termination, to name a few.

The 2000S fits into the A2000's video slot. In the rear of the unit are a network of BNC connectors and two sets of SVHS Ins and Outs. A remote-control box with an SVHS/Composite rocker switch is supplied for background and graphics dissolves.

Waveform and vectorscope tests showed the 2000S's chroma was right on, and burst and luminance were both good. The unit performed well in all phases of the edit session. This SVHS-ready studio-on-a-card gets the "Innovation & Excellence" award.

A3000 owners may notice a flicker problem when using the computer's 31 KHz mode with a genlock. Digital Creations' SuperGen was the only genlock I tested that did not exhibit this problem. I do not know the device's secret, but recommend that A3000 owners using a genlock other than SuperGen set the toggle switch on the back of the computer to 15 KHz mode.

WHO'S GOT THE POWER?

Are you looking for more? Of course, there is more. Digital Creations, for instance, will soon release a product to let you genlock multimillion-color DCTV graphics over live or taped video using a standard SuperGen or the 2000S. Spirit Technologies is promising its Studio A genlock, while VidTech works on its VideoMaster. And let's not forget Neriki's lower-end Desk Top genlock.

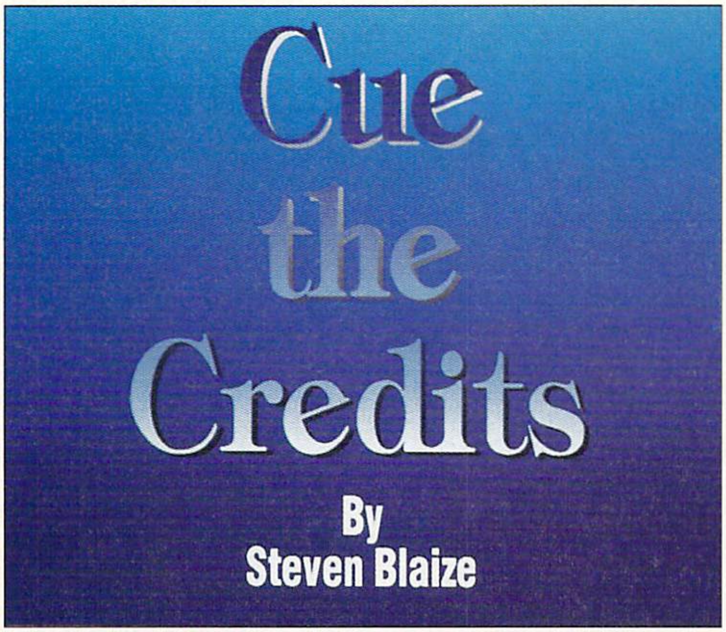
Before you purchase any video gear for your Amiga, think about what you need. Will the genlock you choose give you flexibility in your work? Are its features worth the price? These are just some of the questions you must ask yourself.

If you want primarily to overlay live or taped action with "native" Amiga graphics (4096 or fewer colors, that is) or with images displayed with a device such as Impulse's Firecracker 24, a dedicated genlock is your best bet. If, on the other hand, you need to generate or display high-resolution images and require specific video capabilities, you should consider a multipurpose video product that has genlocking built in. NewTek's Video Toaster, Progressive Peripherals' Video Blender, and GVP's IV24 board all fit into this category. (See "Brave New Worlds of Color," p. 78, for more information on such devices.)

For broadcast purposes, the expensive, dedicated genlocks are often worth the price. Even so, when the cost of a genlock starts creeping toward that of a multipurpose video card, you need to start asking more questions. ■

Widely recognized as the man who controls Joe Robbie Stadium's Jumbotron from an Amiga, Joel Tessler did similar work just prior to the war for the Friendship Games in Kuwait, broadcasting via satellite to over 40 nations, and he was part of the team that introduced Amigas to Eastern Europe via satellite to Turkey and the United Kingdom. On a day-to-day basis, he works as a video and animation consultant to cable stations and networks, not only domestically, but also internationally. Write to him c/o Amiga-World, *Editorial Dept., 80 Elm St., Peterborough, NH 03458.*





A good video-titling program can lend just the right finishing touches to your productions. What should you look for in a character generator, and which CGs are best suited to your needs?

While most people would agree that visuals and sound are the key elements in creating a good animation or video, there is another essential—and often forgotten—ingredient. Rarely will you see a video without text, even if the text is simply the final credits. At the other end of the spectrum, some presentations contain nothing but text screens. Whether you need text for that special title screen, the closing credits, or a whole production, reach for an Amiga character-generation program.

Professional Text—Amiga Style

Character generators (CGs) basically provide you with the ability to enter text, place it on-screen, and superimpose it over a video image. The amount of control you have over the placement, style, color, transition, and timing is what differentiates one product from another.

Stand-alone character generators have been around for a long time and are used extensively in professional video productions (though you can also find simple CGs in many of today's consumer video cameras and video-tape decks). One of the first and best-known makers of these units is Chyron Corporation. In fact, when discussing titling with professionals from video-editing facilities, they will often refer to "chyroning" text over the video, even if they use another manufacturer's character generator.

As technology has progressed, so have character generators. Today's stand-alone units are computers with many capabilities—they can produce amazing results, but so can your Amiga when combined with the appropriate software. Although stand-alone character generators are very good, that is all they are designed to do; your Amiga has many more features under its hood. In addition, the price for stand-alone CGs can be anywhere from a few hundred dollars to many thousands.

Amiga developers have produced a very nice selection of titling and character-generation programs. Generally, the only difference between ►

a titling program and a CG is the developer's choice of terms. Several of the newer programs are referred to as character generators because they contain terminology common to the video business. I will concentrate on the uses, functionality, and quality of titling/character-generation programs and what features to look for when seeking such a package for your Amiga.

Quality Programs, Quality Results

Quality is the primary aspect to take into consideration when making your purchase. Quality is often also the one feature that is responsible for wide differences in price among CGs. The character generators that come with consumer camcorders and tape decks are crude and limiting: The fonts may be only one size and style, and you may get a choice of only eight colors. That might be fine for a vacation video, but not for the video of your daughter's wedding or the stockholders' meeting. In many cases, a simple titling program, such as **Animation Titler** ($79.95, ***Hash Enterprises***) or **TV* Text Professional** ($169.95, ***Zuma Group***), will provide you with all the functionality you need.

While addressing the quality issue, you should understand resolution, antialiasing, and number of colors. Resolution refers to the number of dots that make up your display screen and, consequently, your fonts. Higher resolutions use smaller dots, which in turn produce smoother edges on your letters. Antialiasing is a technique that uses colors in between the font and background colors to further assist in smoothing the edges (as perceived by the human eye).

In general, higher resolutions, greater numbers of colors, and the use of antialiasing within a program produce the best quality characters for your titles. At the very least, you will want to use a program that supports high-resolution overscan modes if you want to attain a high-quality look for your titles.

> Font selection is a very important element in the visual presentation of your titles. Fonts should be legible and of a size that's appropriate for video.

Programs such as those mentioned above employ ColorFonts or any standard Amiga font and provide the ability to perform basic transitions in between text pages. Utilizing ColorFonts also gives you additional flexibility. Generally designed for high resolution and using about half of the 16 available Amiga colors, these fonts come in styles ranging from ice to ice cream and from gold to granite. Some ColorFonts purport to have built-in antialiasing; however, because antialiasing colors vary according to the background color, beware of this claim.

In my opinion, the two best current sources for high-quality titling on the Amiga are **Broadcast Titler 2** ($389.95, ***InnoVision Technology***) and the character generator of the **Video Toaster** ($2495, ***NewTek***). The Video Toaster claims to provide 35-ns characters (referring to how fast the Toaster can change colors), which is roughly the equivalent of two times the horizontal resolution of the standard Amiga hi-res mode. To achieve this resolution, however, the fonts are reduced to half the size at which they were created. Currently, ColorFonts have a size limit of 160×160 pixels; these are then reduced to a maximum of 80 scan lines in the Toaster's character generator.

InnoVision Technology is including a 35-ns super-high-resolution mode in a soon-to-be-released update to Broadcast Titler 2. This will provide crisper characters and will work with the program's antialiasing features. This super-hi-res mode takes advantage of the same modes made available through the Amiga 3000's Enhanced Chip Set (ECS) Denise chip, which should soon be ready for A500 and A2000 machines.

Unfortunately, antialiasing is limited or nonexistent in many of the other titling programs currently on the market. Some programs, such as ***Shereff Systems***' **Pro Video Gold** and **Pro Video Post** ($249.95 and $349.95, respectively), provide antialiasing, but only with their own proprietary fonts.

There are also different levels of antialiasing. TV* Text Professional provides limited antialiasing by using a one-pixel outline of a color between the font and background colors. On the other hand, InnoVision's new **Font Enhancer** ($169.95) reduces and converts any standard Amiga font to a Broadcast Titler 2 font through as many as four levels of antialiasing.

Style It With Fonts

Font selection is a very important element in the visual presentation of your titles. Fonts should be legible and of a size that's appropriate for video. In general, you will want fonts that are at least 45 scan lines high.

As was mentioned above, programs such as Pro Video Post require that you use the developer's proprietary fonts. Broadcast Titler 2 and the Video Toaster also use their own formats, but each one contains utilities that will convert standard Amiga fonts as well. Many other programs simply utilize standard Amiga fonts. Make sure that if you must use proprietary fonts, the developer has fonts available in styles you are satisfied to employ.

Commmercial font collections—such as those available from **ARock Computer Software** (***Masterpiece Professional Fonts***; five-set collection, $199.95) and ***Kara Computer Graphics*** (**Kara Fonts**; sets start at $69.95), as well as many well-designed public-domain fonts—will give you more alternatives if you can use standard Amiga fonts.

Furthermore, some programs have effects—3-D extrusions, gleams, shadows, and so on—that can be placed on fonts. These can come in very handy when you want to achieve that "special look."

Transitional Paging

When you shop for a character generator, transitions are a key element in the decision-making process. Typically, a titling program permits you to lay out the pages (each one is a full screen) of your titling sequence one at a time. You can then use transitions—wipes, pushes, pulls, and scrolls, to name just a few—to change from one page to the next. Many new presentation programs, such as **AmigaVision** ($149.95, ***Commodore***) and **The Director 2** ($129.95, ***Right Answers Group***) provide transitions between IFF pictures. If this

is all you want to do, however, you may not even need a titling program: You can use a paint program to create text screens and then a presentation program to do the transitions.

What a good titling program should provide, therefore, is greater flexibility, such as smooth scrolling (as seen on movie credits) or line crawls (similar to moving ticker tape). Here again, the Video Toaster and Broadcast Titler 2 stand out. (In my opinion, the scroll of Broadcast Titler 2 is the smoothest to date.) Pro Video Post also supplies some DVE (digital video effects) moves for transitions between pages. Of course, real-time DVE moves are part of the Video Toaster and thus can be utilized for transitions if the screen is saved as a framestore file.

Transitions are not always between full screens; there may be times when you want to control changes on specific lines. While this is more difficult—and not handled by most CGs—you can always create duplicate full screens where the only difference is in the specific line.

How Many Colors Does It Take?

As mentioned earlier, the number of available colors is important for antialiasing. It is also essential that you have enough colors to provide for proper design. Most of the programs that use high resolution are limited to 16 colors on a page. Check all the programs to see which ones allow you to change the palette from page to page and which limit you to one set of 16 colors for your entire session.

In addition, you should see what happens if you use page transitions in which the palette changes—you will often see undesirable and abrupt color shifts. InnoVision Technology employs special techniques in Broadcast Titler 2 that allow you to change palettes from line to line within a page. You can, if necessary, have up to 320 colors on the same page.

Most CGs and titling programs also let you import an IFF picture as a background. While this is very useful, keep in mind that the picture will probably have to share the same 16-color palette. Check this feature carefully before you decide definitely on a program.

Letter and Line Spacing

Another basic function of a good titling program is the ability to adjust spacing between lines, words, and letters. Centering and line justification are available in almost all titling programs; however, line spacing in many programs cannot be changed, as it is determined upon page setup. While this is not impossible to work around, you might not wish to re-create entire pages simply to change a font size.

If you want to give your titling a very professional look, you need the ability to perform both global and manual kerning. Kerning is the ability to adjust the spacing between characters so they are more visually appealing. For example, depending on the font style, in the word "want" the "a" can be moved closer to the "w" and the "t" can be moved closer to the "n."

While this is an important key to legibility, many developers overlook kerning features. For example, the Video Toaster's character generator does not offer global kerning, but does include manual individual-letter kerning, while Pro Video Post provides line kerning but not individual-letter kerning. Broadcast Titler 2, on the other hand, offers both automatic global kerning and individual kerning both for its own fonts and those converted via InnoVision's Font Converter.

Room for Improvement

There are a number of areas in which almost all titling programs could stand improvement. A major one is the user interface. While this can be a very subjective matter, it is a key factor in making your purchasing decision. If a program is hard to use, how much will you actually put it to work? Go into your local Amiga dealer's store and try out the character generator/titling programs *before you buy*.

> When it comes to something as essential to video work as titling, you want a program that delivers quality quickly.

While I find that Shereff System's Pro Video line of titlers has always produced fine results, its interfaces are entirely keyboard-driven. The developer seems to have ignored the fact that the Amiga comes with a mouse. (I have, however, worked recently with a demo of a new titling program from Shereff, CG II, and I believe that many of my complaints will soon be addressed.)

The Video Toaster's character generator could use some work, too, and I look forward to the 2.0 version of that software. Most of the other CG/titling packages for the Amiga use the mouse and pull-down menus, and some also include keyboard equivalents, yet, overall, this is an area that I feel every Amiga developer could do further work on.

A Wish List

A couple of other items on my wish list for future enhancements to current titling software include:

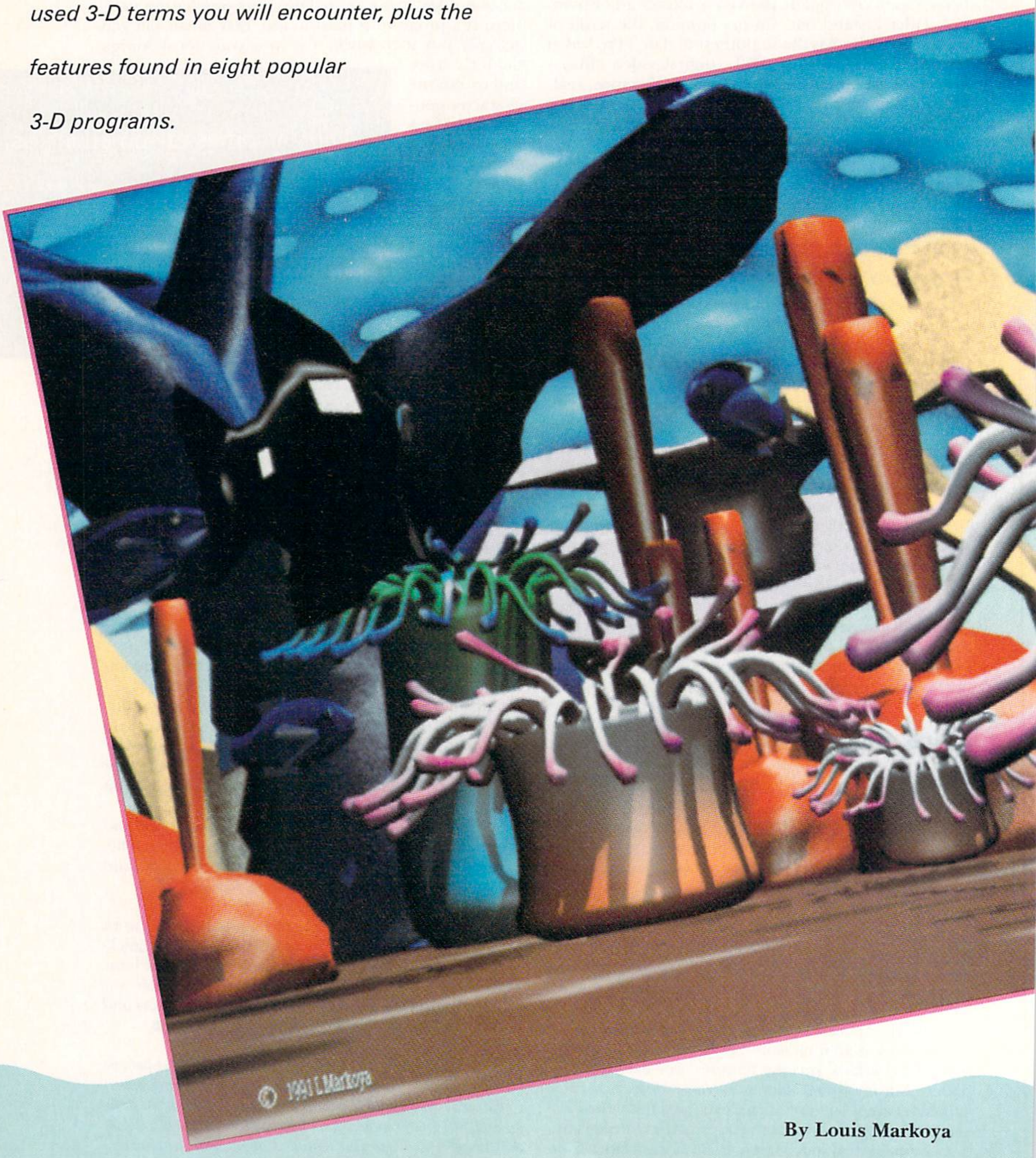
Full-color support: With more and more 24-bit display boards coming on the market, we could use a ColorFonts-format update that includes 24-bit full-color options. It would also be nice to see direct support for these boards, so that we could load and change 24-bit color backgrounds for our titles.

Scalable fonts: With a multitude of Postscript and other scalable-font formats readily available, the ability to use these fonts with current titling programs would dramatically increase the software's flexibility.

When it comes to something as essential to video work as titling, you want a program that delivers quality quickly. All of the programs mentioned here perform the basic job of character generation. You must decide which critical factors will make a difference to your projects and then find the one package that fits your needs. ■

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Especially if you are new to the realm of 3-D, the plethora of terminology can bewilder the mind. Here is a rundown of a number of the commonly used 3-D terms you will encounter, plus the features found in eight popular 3-D programs.



By Louis Markoya





The Way Of 3D

Those of us who have been around Amigas a while have seen 3-D technology change dramatically. First we had crude primitives. Now we have sophisticated special effects. We have moved from standard IFF displays to specialized devices and several 24-bit options. Instead of single-frame IFF saves, we have ANIM files and single-frame recording.

There has been an almost relentless progression since the Amiga's launch nearly seven years ago. In 1985 we had software that allowed little more than color setting. Now we can simulate any material, and animate textures to produce effects once limited to the imagination. And the best part is that we can do all this on a home system.

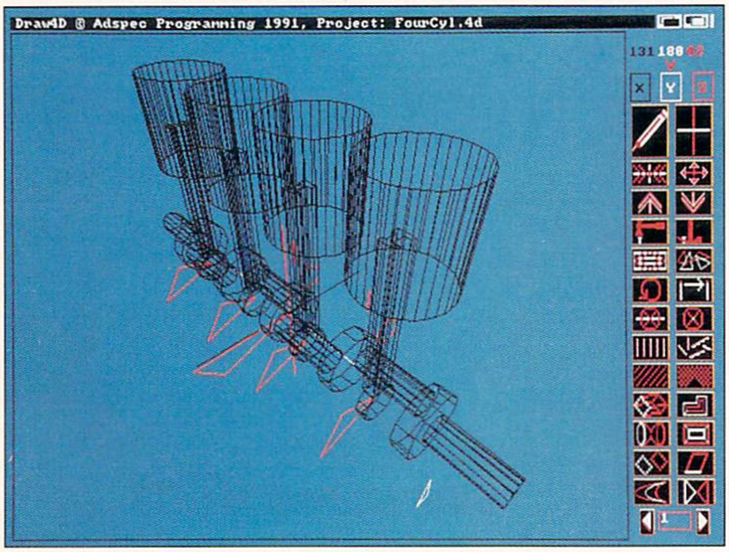
With the advent of several native 24-bit boards, the Amiga's display now rivals that of most high-end systems. In fact, at the 24-bit level, the computer underneath the display is of little consequence—except in the areas of addressable memory and raw processor power. And memory and power are exactly where the Amiga shines!

Many Amiga 3-D packages are third-generation. Getting these features on different platforms costs anywhere from $2000–$50,000 or more (that is just software). Thanks to this effort, with existing software and your Amiga, you can achieve many of the super-computer graphics effects and animations that you see on TV.

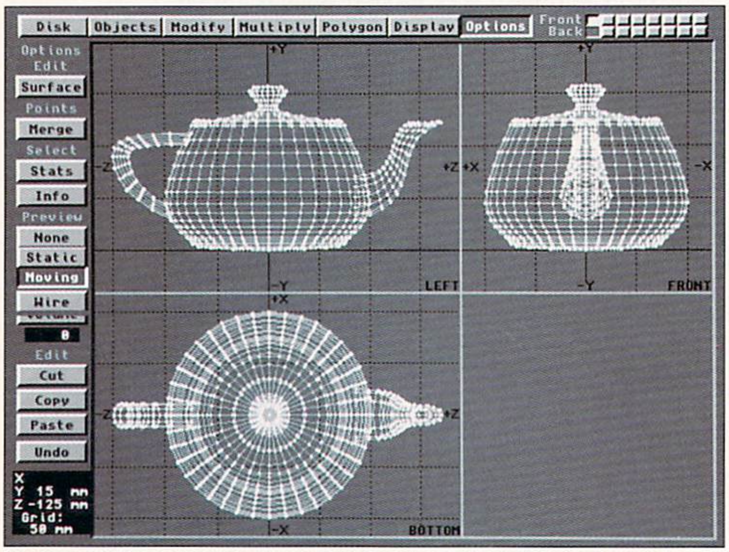
Today's sophisticated features make Amiga 3-D terminology more and more esoteric. That is why we are defining them in plain English. So choose the options you would like to exercise, match them with the 3-D program-features chart, check these explanations of terms, and see what packages fit your budget. We now have the tools to do what Disney dreamed of, and maybe, with a little practice, you can fulfill your own dreams—or reach beyond them. ►

Anti-Aliasing — A technique that involves the averaging of pixel (color) values at edge boundaries to eliminate the stair-step lines (also known as jaggies) in computer graphics. Some programs give you control over alias values, allowing you to soften the blend between a hard object and the background.

Attributes — The combined characteristics assigned to a 3-D object that define its appearance. They may include color, transparency, reflection, specularity, hardness (glossiness), index of refraction, texture, and image map.



This Draw 4D Pro rendering shows wireframe modeling and hierarchical structure.



Modeler 3D, the object-construction portion of LightWave, is an example of a modeler.

Auto Sculpting — A program operation that automatically makes a 3-D model, given the front, top and side views.

Auto Subdivide — A program feature that automatically subdivides polygons when any operation requiring this is requested.

Background Images — Objects used as backdrops for the rendered scene. (If your scene consists of a plane's cockpit, then a cloud or a landscape is your background image.) Some programs can load backgrounds sequentially to provide an animation behind the animation your object and camera movement forms.

Boolean Operations — A method for creating complex objects by intersecting an existing object with a second object. The result is a new object that you have "cookie cut" with the shape defined by the second object. If you place a tube so that it intersects a sphere, and then perform a Boolean merge on the two objects, for example, you produce a ball with a tunnel through it.

Bump Mapping — A technique that uses an image's grayscale to raise the surface of your object. Usually one end of the spectrum raises it, while the other depresses it, or acts as the "normal" level. Some programs, though, let you adjust the surface height beyond the extremes of grayscale control. Most image-mapping applications let you select flat, cylindrical, or spherical mapping, as well as choose the axis of the application.

Envelopes — Part of a key frame, these curves control some aspect of an animation or object. Common uses are for motion, transparency, light intensity, and morphing.

Foreground Images — Objects shown in front of a rendered scene, such as the instrumentation in a plane's cockpit. (In this example, your rendered scene is visible through a window, which is usually defined by choosing color zero, or simply leaving it black.)

Framebuffer — An area of memory specifically allocated for graphics display. Many devices include this memory area and extra circuitry for color tables, RGB, or composite output.

Gouraud Shading (Intensity Interpolation Shading) — A technique that eliminates intensity differences between adjacent polygons. A linear interpolation of intensities is calculated between edges, which gives the impression of a smooth surface.

Hardness (Glossiness) — A quality that defines the area and fall-off of a specular highlight on an object. The wider the area or softer the setting, the more an object looks specular. With high values, the highlight becomes tight and the edge transition small, creating the effect you would see on glass or water.

Hierarchical Objects — Images formed by specific parent/child objects. An arm object, for instance, consists of a child object of a hand, which is made up of child objects of fingers. Parentage defines which parts follow when an object has motion.

Hierarchical Motion — The movement of a parent object that has child objects joined in that motion. For example, an arm object, which has hand and finger child objects, can be raised or lowered with the hand and fingers following.

Hidden-Line Removal — A form of wireframe display that excludes any 3-D information that is out of the di-

rect sight of the camera or viewer. All edges obscured by visible surfaces are removed and not displayed.

Image Mapping — A technique in which you map image files to the surface of an object. You can simply add a pattern to a ball, or map a cloud pattern on a plane to represent the sky. These standard image-mapping examples are color maps, meaning the color of the object is replaced with the image color. Transparency mapping, reflection mapping, and bump mapping are more sophisticated image-mapping techniques.

Index of Refraction — The amount light bends (or is refracted) as it passes through an object or substance. All substances in nature fall within a 1.0–3.55 index. By using this parameter, some ray tracers can simulate reality to a higher degree.

Key Frames — The cels within an animation that serve as reference points and represent the most important images or poses. Some software can automatically interpolate the placement of objects and lighting between key frames.

Modeler — A stand-alone program or portion of a 3-D program devoted to object construction and editing. Sophisticated modelers offer tools such as magnetic control of points, Boolean operations, and slice functions.

Phong Shading — An algorithm that lets you represent specular reflection accurately. It draws a specular highlight on an object where the angle of incidence and reflection are the same. This specular light is shaded smoothly with the object or diffuse light color.

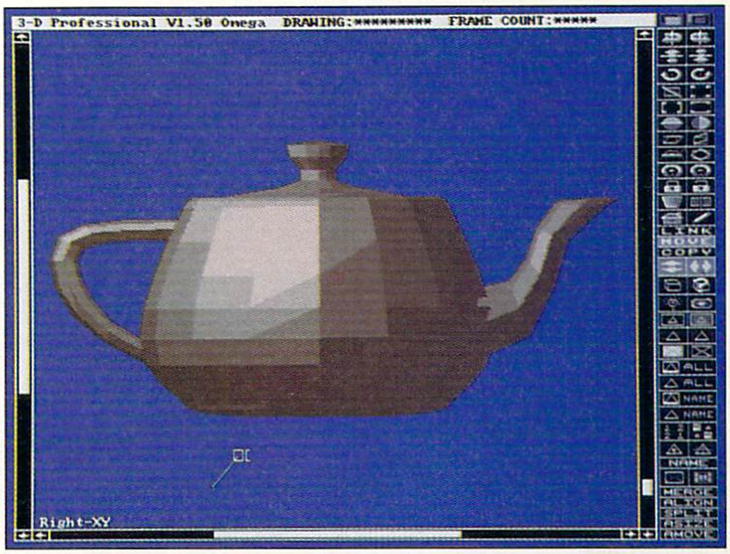
Primitives — Objects made up of fundamental geometric shapes, such as spheres, cubes, and pyramids. Some programs only let you combine these to make more complex shapes, while others offer them to supplement their modeling capabilities.

Ray Tracing — A method whereby your computer traces a beam of light (diffuse, specular, or transmitted) to and from each visible surface in a scene. Although this method is time-consuming, it produces the most realistic images. Objects can have true reflective and refractive characteristics, and you can represent shadows accurately.

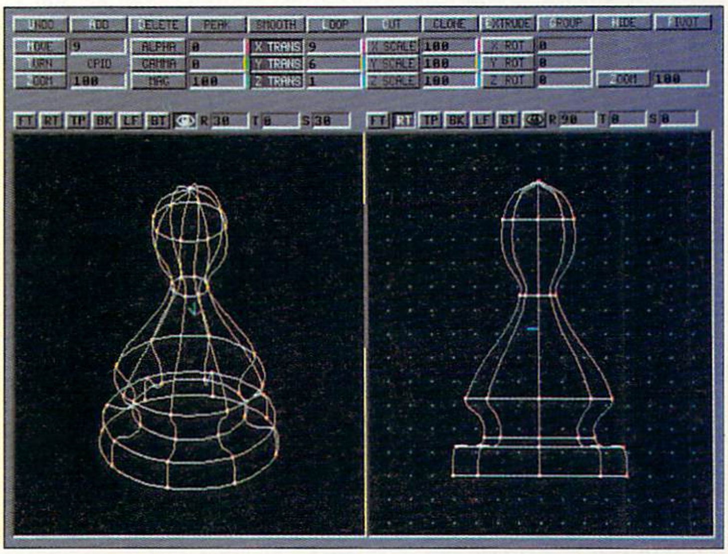
Reflection Mapping — An algorithm for causing the surface of an object to display a realistically distorted reflection of the background scene. The program you use may make one extreme of the grayscale spectrum equal to no reflection, while the other is equal to 100 percent reflection. With the grayscale controlling the transition, it is a breeze to create oddly shaped mirrors, puddles, and fancy reflective patterns.

Resolution — The amount of information a display screen can hold. A pixel is the smallest unit your screen can display, and resolution is determined by the number of pixels it can address horizontally and vertically. Normal Amiga modes are 320×200 (lo-res) and 600×400 (hi-res/interlace). The first number is the amount of horizontal pixels in the picture, and the second is the vertical count. Because 3-D work is usually realistic, you need more colors and/or resolution. Use a resolution of 736–782×482 for the final frame size in video applications. For professional-quality print (slide or film), go even higher—from 1200×800 to over 8000 pixels squared.

Single-Frame Controller — A device for addressing video tape that has been striped with time code, so that you can record animation to tape, one frame at a time. By reading the time code on a tape, the device can address each frame sequentially to record animation.



A solid model, as presented by 3D Professional.



JourneyMan uses splines to draw the curved surface of this pawn.

Single-Frame Recorder — A high-end video recorder that is capable of recording single frames of animation one at a time. This process also requires that your deck have some provision for generating time code (a specific addressable sequence that you prerecord on the tape's frames). Popular models for generating single-frame animation include the Sony VO-9850 and 5850 (3/4-inch), Panasonic AG-7750, and JVC BRS-811 (SVHS). ►

Slice Functions — A technique whereby you form slices of an object. All cross sections have the same number of points, but you can shape them differently and connect them to form a single object. This operation is also known as "skinning."

Solid Modeling (Scanlining) — The fastest method for rendering animation. It calculates and displays polygons as if they were closed surfaces or solid material. You can employ different shading models for smoothing purposes, or use different textures.

Specularity/Specular Highlights — The manner in which light is reflected off a surface. Dull or rough surfaces produce a wide and soft specular highlight, while smooth surfaces produce a small and bright one.

Splines — A mathematical method of joining disconnected points with a smooth curve. Splines are used in object modeling to define curved surfaces, and in 3-D animation to define motion paths.

Texture — An algorithmically derived surface quality that you can apply to 3-D objects. Common textures, such as wood, marble, checks, dots, and grids, let you define the grain color, pattern, and randomness. More

FEATURES OF LEADING 3-D GRAPHICS PROGRAMS

BY GREG ROSTAMI

Program:	Caligari 2	Draw 4D	Imagine	JourneyMan	LightWave	Real 3D	Sculpt	3D Pro
Company:	Octree	Adspec	Impulse	Hash	NewTek	Activa	Centaur	Prog. P&S
Price:	$399	$249	$350	$500	(In Toaster)	$199	$179.95	$299.95
MODELING								
Triangles	Yes		Yes		Yes	Yes	Yes	Yes
MS Polygons	Yes	Yes			Yes	Yes		Yes
Constructive Solid			Spheres	Yes+	Yes+	Yes	Spheres	
Geometry			Promised					
Spline Patches				Yes+				
Spline Control			2D only	Yes+		Some	Yes	Yes
Path Extrudes	Yes	Yes	Yes+	Yes		Yes+		Yes
Boolean Operations	Some		Yes		ADD	Yes+		Yes+
Auto Subdivide						Yes		Yes+
Bend Twist Taper	Some	Bend	Some	Yes+	Yes+	Yes+		Yes+
Snap to Center	Yes	Yes				Yes+	Yes	Yes
Snap to Grid	Yes	Freeform	Yes+	Yes	Yes	Yes	Yes	Yes
Keyboard Equivalents	Yes	Yes+	Yes	Yes+	Yes+	Yes+	Yes+	Yes+
Speed of Feedback	Fast+	Fast	OK	OK	Fast+	Fast	OK	OK
Remap to Spline	Some		2D only	Yes+		Yes+	2D only	Some
Hierarchy Design	Yes+	Yes	Yes+	Yes+	Yes	Yes+	Yes	Yes
Subdivide Primitives	Yes		Yes		Yes	Yes+	Yes	Yes
Magnet Function	Yes+	Yes	Yes+	Yes	Yes	Yes+	Yes	Yes
Auto Sculpting			Yes+	Yes		Yes		
Connect X Sctn		Yes	Yes		Yes+	Yes+	Yes	Yes
User Macros						Yes	Yes+	
Assign Functions			Yes+			Some		
Convert Bitmaps		Overlay	Yes			Yes+		Yes
Algorithmic Models							Spheres	Tree/Mntn
Font Support	Some	Yes+	Yes+		Some	Some	Yes+	Yes
Hide Points	Yes	Yes+	Yes	Yes	Yes	Yes	Yes	Yes
Object Primitives	Yes				Yes+	Yes	Yes	Yes
Extrude	Yes	Yes+		Yes	Yes	Yes	Yes	Yes
Spin	Yes	Yes+		Yes	Yes	Yes	Yes	Yes
Polygon Divides	Yes	Yes			Yes	Yes	Yes	Yes
Slice Operation	Yes					Yes	Yes	Yes
Hierarchical Objects	Yes	Groups/Melds				Yes	Yes	Yes
ANIMATION								
Spline Paths	Yes	Yes	Yes	Yes	Yes+	Yes	Yes	Yes
Hierarchy Animation		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Keyframing	Yes+	Yes	Yes	Yes+	Yes+	Yes	Yes	Yes
Keypositioning	Yes		Some	Yes+		Some	Yes	
Morphing		Yes	Yes	Yes	Envelope	Yes	Yes	Yes
Motion Interchange			Cycles	Yes+	Yes		Yes	
Time Envelopes				Yes+	Some			
Time Stretch/Squeeze	Yes	Yes	Some	Yes+	Yes			Yes
Ease in and out	Yes	Yes	Yes	Yes+	Yes	Yes	Yes	Some
Object Dissolve	Yes	Fades	By Morph		Envelope			Yes
Anim Image Maps	Yes		Yes	Yes	Yes+	Yes		Yes

sophisticated textures allow for bump mapping and fractal patterns. Textures are valuable because they require little memory, yet add to an object's realism, and in some programs they can be animated.

Three-Dimensional (3-D) Objects — Shapes defined in space as having three dimensions. The object is usually defined by polygons or triangles. Common methods for object construction include extrusion, which adds depth to a shape outline, and spinning (or lathing), which spins a shape to form a circular object. Primitives, multi-sided polygons, triangles, and spline patches form 3-D objects on the Amiga.

Transparency Mapping — A technique that defines see-through areas of objects, such as windows in a wall. It is most effective for creating transparent shapes that are otherwise difficult or impossible to model.

Wireframe — A display mode that shows only the outline of each polygon in an object. It uses few bitplanes and requires no shading calculations, so you can render the object quickly. ■

Louis Markoya is the 1989 winner of the AmiEXPO Art Conference's 3-D Competition. Write to him c/o AmigaWorld *Editorial, 80 Elm St., Peterborough, NH 03458.*

Program:	Caligari 2	Draw 4D	Imagine	JourneyMan	LightWave	Real 3D	Sculpt	3D Pro
SFC Support	Yes	DOS Script	Yes		Yes	Some	Some	Yes
Anim Files	Yes	Yes	Yes	Yes		Yes	Proprietary	Yes
Anim Scripts	Yes		Yes	Yes	Yes		Yes	Yes
ARexx Support					Yes			Yes
RENDERING								
Method of 3D	MS Poly	MS Poly	Tri	CuPatch	MS Poly	MS+CSG	Tri	MS Poly
Rendering	Scan	Scan+Strc	Scan+Ray	Ray	ZBuf+Ray	Ray	Scan+Ray	All
Shadows	Yes+		Yes	Yes	Yes	Yes+	Yes	Yes+
Light Types	Sp+Pt+Sn	Pt+Sn	Sp+Pt+Sn	Sp+Pt+Sn	Sp+Pt+Sn	Sp	Sp	Sp+Pt+Sn
Gouraud Shade	Yes	Yes						Yes
Max Resolution	8000	1024	17000	Infinite	3008	32000	Infinite	Infinite
Texture Mapping	Yes		Yes	Yes	Yes+	Yes		Yes
Texture Anim	Yes	Yes	Morph	Some	Morph+Move	Yes		Some
Diffuse Map	Yes				Yes+	Yes		Yes
Specular Map	Yes				Yes+	Yes		Yes
Transparency Map	Yes	Yes	Yes	Yes	Yes+	Yes		Yes
Reflection Map	Yes		Yes	Yes	Yes+	Yes		Yes
Environment Map	Yes+		Yes	Yes	Yes+			Yes
Image Mapping	P+C+S	P+C+S	P+C+S	P+C+S	P+C+S	P+C+S		P+C+S
Antialias Maps	Yes		Yes		Yes+	Yes+		Yes
User Texture Libs	Yes		Yes	Yes	Yes	Yes+		Yes
Bump Mapping			Yes	Yes	Yes+	Yes+		Yes
UV Mapping	Yes			Yes+				
Fog Effects		Yes	Yes	Yes	Yes	Yes		Yes
Gradient BKG	Yes		Yes		Yes		Yes	Yes
Blurred Particles					Yes+		Yes	
Background Pic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Foreground Pic	Yes		Yes		Yes+		Yes	Yes
Framebuffer	Mi+Ta		FC		Toaster	Ta	Yes	Yes
IFF, DCTV, HAM-E	I+D+H	I+D	I+D	I	I	I+D	I	I+D+H
Object-Format Support	Geo+Ca+Sa	Draw 4D	Im	JM	All-RI-JM	RI+Sa	Sa	3DP+Geo
Multitasks	Yes	Yes	Yes	Yes+	Yes	Yes	Yes	Yes+
Index of Refraction				Yes	Yes	Yes		Yes
Phong Shading	Yes				Yes	Yes		

Legend of abbreviations, presented alphabetically:

All-RI-JM—All polygon-based file formats except for Real 3D and JourneyMan. *C*—Cylindrical image mapping. *Ca*—Caligari object-file format. *CSG*—Constructive solid geometry. *CuPatch*—Cubic patches (spline-based smooth surfaces). *Cycles*—A feature in Imagine that allows you to assign 3-D objects to skeletal hierarchical chassis. *Envelope*—A user-defined time graph showing how a given parameter changes over time. *FC*—The Firecracker output device. *Geo*—The Geo file format of 3-D objects from Oxxi/Aegis's VideoScape 3D. *JM*—JourneyMan. *Mi*—Mimetics' FrameBuffer. *MS Poly*—Multisided polygons. *Overlay*—A program's capability to load an IFF image in the background of the modeler to serve as a source of reference for modeling. *P*—Planer image mapping. *Pt*—Point light (acting like a light bulb). *Ray*—Ray Tracing. *RI*—Real 3D. *S*—Spherical image mapping. *Sa*—Sculpt Animate 4D's object format. *Scan*—A method of rendering that draws the image one line at a time, starting from the top of the screen and moving down. *Sn*—Sun (acting like the sun casting parallel rays. *Some*—Certain limiting factors are present in the given feature. *Sp*—Spotlight. *Spheres*—Spheres in these programs can be represented as CSG primitives. *Strc*—Structured drawing files that can be ported into DTP programs for high-quality output to laser printers. *Ta*—TrueVision's Targa IBM-compatible framebuffer. *Tri*—Triangles. *Yes+*—Exceptional characteristics in the given feature. *ZBuf*—Z-buffer; a method of rendering that draws the 3-D objects one polygon at a time.

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Buyer's Guide

Amiga Video and Animation Utility Programs

By Oran Sands and Geoffrey Williams

Many of the articles in the *1992 Video and Animation Special Issue* cover the major Amiga hardware and software you need to get the big jobs done. There is, however, a strong cast of supporting characters—those handy, often invaluable utility programs—that deserve more than a passing mention in any "complete" examination of Amiga video and animation.

Some of these items are nifty, time-saving gems that fill niches that defy categorization. Others are full-blown applications in their own right, serving a wide variety of needs and purposes. While many are commercial programs in the larger Amiga marketplace, others are freely distributable in the public domain (PD) or available for a nominal fee as shareware. You can find all of the PD/shareware programs on national networks, such as CompuServe or GEnie, on local bulletin-board systems (BBSs), on Fred Fish or other on-disk collections of PD software, or from local users' groups. *(To contact the developers of commercial programs, consult the "Manufacturers'/Distributors' Addresses" list on page 127.)*

The Video Utilities section of this guide was compiled by Oran Sands, who is a video producer and engineer for Methodist Hospital of Indiana. Animation Utilities is the work of Geoffrey Williams, who is the executive producer for Creative Business Communications and head of the Amiga Video-Graphics Guild. Write to either of them c/o *AmigaWorld*, 80 Elm St., Peterborough, NH 03458. ►

VIDEO UTILITIES

VIDEO UTILITIES CAN vary widely in terms of program type and scope of op-

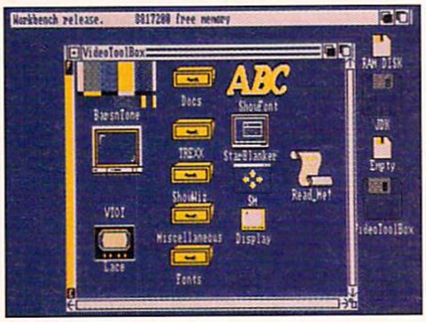


Figure 1. Keeping all of your utilities in one compact, easy-to-access place will help you in your video-production work.

eration. Maybe it is best to think of a video utility as any program that can help you get the job of creating graphics for video done faster and/or better.

In any event, having all my video tools in one compact place (such as my "VideoToolBox" screen in Figure 1) makes all my video work a great deal easier.

COMMERCIAL PROGRAMS

Art Department Professional
ASDG
$240

Art Department Professional is simply the premier program for manipulating graphics files and images. Using 24-bit imagery as a common denominator, AD Pro converts virtually any file format, whether native Amiga or not, to any other format. You can change the size, number of colors, and resolution of your im-



Art Department Professional

ages with little or no loss in quality. (In fact, some AD Pro conversion processes create better-looking files than the file-creation process of your regular software.) Artistic effects and the combining of different palette images are also possible.

Complete with ARexx control, AD Pro works with almost all other graphics programs, as well as digitizing and color-output hardware. And chances are that with the new, substantially enhanced AD Pro 2.0 ($299), you will be hard pressed to find a video-manipulating function that is not available.

Butcher
Eagle Tree Software
$37

PIXmate
Progressive Peripherals & Software
$69.95

Once upon a time, these two programs were the only tools available for use in modifying graphics. The arrival of Art Department Professional tended to nullify the market for Butcher and PIXmate, but they still work well and are a lot less expensive, too. Both packages contain some interesting features that you will not find elsewhere,



so do not be reluctant to try them if you cannot afford the higher-priced programs.

The Director, Version 2
Right Answers Group
$129.95

If you cannot find a package that manipulates graphics to your satisfaction, then try using The Director, Version 2, to write your own program. The original Director was touted as an animation program, but it is in reality a graphics application language that enables users to create practically anything they need—from page flipping to special effects to the addition of sound—by writing scripts for each particular job. With Version 2, you will find the creation process much easier, as the addition of custom interfaces automates several of the more tedious functions.

Many game programmers are now using The Director as a programming language because of its powerful ability to make fast-running, easy-to-create animations. The Director also provides for user interaction, making interactive applications a snap!

Video Escort
Mr. Hardware
$300

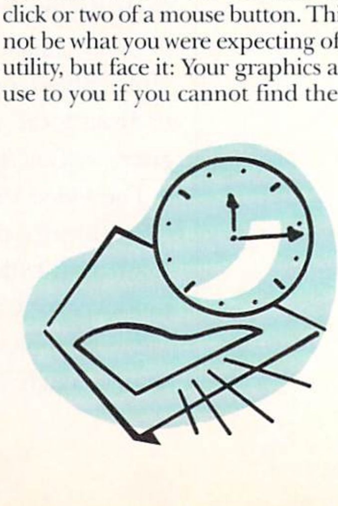
Assume that your video company is a runaway success: Monitoring all you do and need to do is not easy. How do you keep track of your clients and their needs and requests, and the time you spend fulfilling them? How do you prepare an estimate and a budget? Video Escort is the best answer to these questions that I have seen to date.

The package, based on Precision Software's Superbase Professional database program, is an application that is designed to make life easier for the experienced video professional and beginner alike. The key to a successful video shoot is to plan for every possibility, and Video Escort lets you do just that by giving you a checklist to work from. Virtually everything the event photographer needs to keep track of is included in this program. If the standard program features don't suit your work, you can customize almost any application to meet your needs.

Directory Opus
INOVAtronics
$59.95

DiskMaster
Progressive Peripherals & Software
$49.95

The biggest problem you encounter after working with video graphics for a while is actually finding the graphics. All too often you ask yourself, Now, just where did I put that logo? You could wade through lists that are displayed by typing DIR DH0: into a Command Line Interface (CLI). Or, you could take the pressure off and use a directory utility program. Such a program substantially cuts down on the time you spend sorting through disks and directories. The two I have listed above also allow you to view images, play sounds, show fonts, read and print text files, and so on—all with a simple click or two of a mouse button. This might not be what you were expecting of a video utility, but face it: Your graphics are of no use to you if you cannot find them!



ILLUSTRATED BY CATHARINE BENNETT



Elan Performer 2.0
NewTek
$149

I can think of no better way to gather a group of graphics and animations for display than by using Elan Performer. Other programs chain images together for predetermined sequencing, but Elan Performer lets you select images randomly and on a moment's notice. Elan Performer lends itself well to use in live studio presentations: Regardless of how much your talent allows you to ad lib, with Elan Performer you will be able to put the correct graphic up on the screen at the press of a key.

ProWrite 3.2
New Horizons
$175

Video scripts do not appear out of thin air—someone has to write them—and a word processor is certainly better than a typewriter. A word processor that lets you use true parallel columns is even better. ProWrite 3.2 is all you need to do some serious writing. The program allows the use of almost any Amiga font, has a what-you-see-is-what-you-get (WYSIWYG) feature, employs IFF graphics within a document, and prints in color (and to PostScript printers, as well). With ARexx and macro support, ProWrite is fast and friendly, a good combination for any writer.

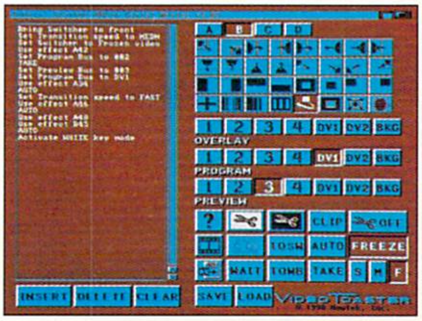
PD/SHAREWARE PROGRAMS

ShowFont
Arthur Johnson, Jr.

Any video artist worth his or her salt has more fonts than you could ever imagine. After a few years of creating videos on the Amiga, you too will have more fonts than you can keep track of. If you do not want to have to wonder if a font is large or small, whether it is a ColorFont, or serif or sanserif, then I suggest you use ShowFont, a nifty program that displays font directories and fonts upon selection, regardless of size or design. It is an invaluable tool if you want to save yourself from wading through several megabytes of font files. As a freely distributable program, ShowFont's price is right!

Trexx
Keith Williams

It was inevitable that freely distributable programs for use with NewTek's Toaster would eventually be available, and Trexx is the first. This program has a miniature switcher interface that you click on as if it were the real thing. Trexx creates a script file that you can use via ARexx to control the Toaster—a great way to automate a sequence of Toaster effects. Every mouse click you make is echoed by the appropriate command in a column on the left side of the screen. Why try to write ARexx scripts when Trexx can do it for you?



TRexx

Video Tools on Tap
Mike Berro
BCS Software

This shareware program has been around for quite some time; a newer, more complete version is now available commercially (see "Animation Utilities"). Video Tools on Tap (VTOT) provides you with commonly used test signals and screen manipulations, so your Amiga can be turned into an SMPTE (Society of Motion Picture and Television Engineers) color-bar generator in a matter of one mouse click. And VTOT contains numerous other features, all designed to be of use to the video professional.



Video Tools on Tap

Those who have the public-domain version of VTOT may find that, depending on the hard-drive controller you have installed, it may not work. No such problem exists with the commercial version, which also includes additional programs that check for illegal NTSC (National Television Standards Committee) colors in any screen and help you add and subtract SMPTE time codes. If you cannot find VTOT on your local BBS, look for Bars 'N Tone, another public-domain program from the same programmer, which provides color bars and an audio tone to help you correctly set up your video equipment.

ShoWiz
J. L. White
Merlin's Software

ShoWiz is both a display and slide-show program. It can display individual pictures or entire directories of images, and it works well with overscan images and all the standard resolutions. Although ShoWiz creates its own script files, you can modify them to customize any presentation. ShoWiz also performs transitions between images in 26 different ways.

One unique feature of the program is that it allows you to individually select text, text-shadow, and background colors when you display your text files. In addition, ShoWiz works from the CLI or the Workbench, and best of all, it is freely distributable.

StarBlanker
Chris Bailey

Intended as a screen-blanking program, StarBlanker provides a great way to scroll star backgrounds. Beginning with a mouse click, after a user-preset interval, the program presents you with a star field on your screen. Of what use is this, you may ask. Well, you could tape the field of stars and then run it back through your genlock/Toaster and place titles or your latest spacecraft animation over it. Or you could run the star field on a second Amiga that is fed to your genlock/Toaster.

StarBlanker has one small problem, however: It runs in noninterlaced mode and should not be taped as such. So before running StarBlanker, I suggest using a freely distributable screen-interlacer such as LACE, DoLACE, SetLace, or the like. StarBlanker also works well as a regular screen-blanker, and is one of a few such programs that can be turned on and off via icon.

Note: Many of the PD video utilities are available for $7 from Excalibur Graphics, 2028 E. 109th St., Indianapolis, IN 46280. ►

Animation Utilities

THE UTILITIES PRESENTED here—both commercial and PD/shareware—are designed to make animating easier by letting you go beyond the capabilities of your current animation package. Whether you want to add sound, perform multiplane layering, or change resolution without having to reload an entire animation frame by frame, these tools can do the job for you.

COMMERCIAL PROGRAMS

Animation: Series
Hash Enterprises

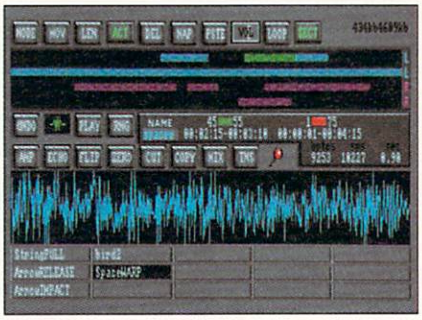
Hash Enterprises has released a series of utility packages designed to be used with animations. Unfortunately, most of them work with the proprietary Hash format rather than the standard ANIM



format (although the programs can save the frames as individual IFF pictures). The two packages that fully support the ANIM format are Animation:Soundtrack and Animation:Editor.

Animation:Soundtrack ($119.95) is a powerful program that lets you interactively synchronize digitized sounds to an animation and then edit those sounds by using a full complement of included tools. The real flexibility of this package is in its ability to communicate directly with a playing animation: You can watch the animation while you adjust the sound. This makes Soundtrack a perfect tool for performing such difficult tasks as synchronizing sounds to lip movements.

Animation:Editor ($59.95) provides you with such editing features as the ability to change the resolution and number of colors of an existing animation, along with the ability to convert the animation into overscan. Editor can grab any double-buffered playing animation and compile it into a compressed file, which



Animation:Soundtrack

can then be converted into a standard ANIM file. An animation that does not fit on a single floppy disk can be saved in the Hash format, spread out across multiple disks, and played via Hash's freely distributable animation player.

If you own Animation:Editor, you can convert animations from the other programs in the Hash series into standard ANIM files. **Animation:Multiplane** ($89.95) is a powerful tool that allows you to create multilayered animations and contains such features as dissolves, color filtering, pixelation, motion blur, drop shadows, and transparency—all of which can be happening as one picture moves across another; **Animation:Effects** ($49.95) helps you to create complex keyframed movements of brushes while maintaining control over lighting,perspective, and shading. **Animation:Stand** ($49.95) allows you to create pans and interpolated zooms on IFF pictures.

AniMagic
Oxxi
$139.95

If you need even more powerful animation-editing capabilities, there are complete animation effects/editing pack-



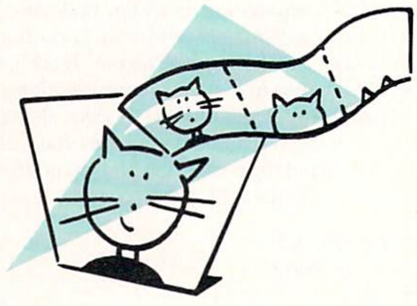
AniMagic

ages available. Oxxi's AniMagic has by far the most options. With it, you can, for example, map moving animations onto the surface of a spinning cube. AniMagic contains thousands of other digital video effects (DVEs), including blinds, spins, squeezes, page turns, confetti, and tumbles. Changes to resolution and the ability to add overscan and custom screen sizes are just a few of AniMagic's animation-editing features.

Although AniMagic can perform some amazing tricks—things not possible with any other product—it is, unfortunately, not very fast and hampered by a perplexing user interface.

Animation Station
Progressive Peripherals
$49.95

While it has fewer capabilities than AniMagic, easy-to-use Animation Station offers basic editing features, such as cutting, splicing, and merging one animation on top of or behind another. It creates a visual storyboard of all of the



frames of your animation so that you can see what is happening in each frame. You can change the colors on a frame-by-frame basis, or you can convert an entire animation to gray scale. Animation Station's special effects include motion blur of moving objects, animated mosaics, flipping, scrolling, and half- and quarter-size reductions. With this package, you can crop, set the individual timing of frames, and even synchronize sound effects. Though it does not offer resolution changes, Animation Station comes with a very fast, distributable animation player that can play animations that have changing color palettes.

Image Finder
Zardoz Software
$65

Image Finder is a picture-file database that creates a miniature icon for each picture so that you can click on an icon to load a picture into a program of your choice. Image Finder can also make an icon from any frame in an animation so that you can have a database of animations. In addition, you can use the program to devise a visual database of all the key sequences in your animation, which is a very easy way to make a storyboard. Image Finder's gray-scale renditions are very good, and it can create color renditions, as well.



PowerPacker Professional
Distributed by JumpDisk
$32

Animations are often large, making them difficult to distribute. PowerPacker Professional comes to your rescue, ready to compress animations. Depending on the complexity of the animation, PowerPacker can deliver at least 30 percent, and sometimes as much as 70 percent, compression. After it is compressed, the included PPAnim player plays the animation, which can later be decompressed into a standard ANIM file without any loss in image quality. There is a shareware version of PowerPacker, but the commercial version is dramatically faster and far better suited to animation compression.

Video Tools on Tap
Neriki
Price unavailable

The final destination for most animations is video, which is why I recommend Video Tools on Tap (VTOT)—a former shareware program now released in an enhanced commercial version. (The shareware version is described in "Video Utilities.") Providing dozens of useful video applications, VTOT lets you easily center and move around an animation as it plays from within any program, and fade up and down to black at variable speeds. Most importantly, VTOT automatically detects illegal NTSC colors in your animation that could cause bleeding and smearing after it is transferred to video.

Elan Performer 2.0
NewTek
$149

If all you really need to do is play and seamlessly chain your animations together, NewTek's Elan Performer 2.0 lets you assign animations to each key on the keyboard. You can play back your animations as you choose or chain them together in any fashion. While what it does is simple, Performer is also very easy to use and great for quickly laying animations onto tape.

PD/SHAREWARE PROGRAMS

One of the best sources for basic animation utilities is the public domain, where you can find a wide variety of shareware and freeware products. The Amiga Video-Graphics Guild also has most of these programs on its AVG Animation Assistant disk, available directly from that group for five dollars (see the note at the end of this section for details).

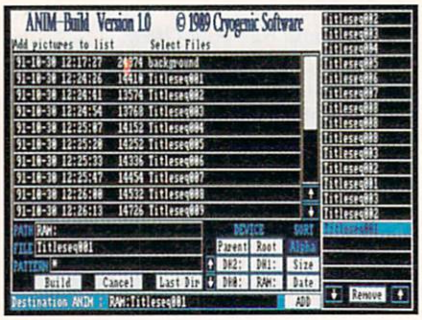
View 3.0
Mike Hartman

Movie 2.0
Eric Graham and Ken Offen

Superview 3.1
David Grothe

It takes a long time to load animations into paint programs such as Electronic Arts' DeluxePaint IV. To display the animations, it is usually much easier and faster to use an animation display program. While one does come with DeluxePaint, there are faster animation players available that offer additional capabilities.

All animation players play animations ►



ANIM-Build

at slightly different speeds, but the fastest I have found is View 3.0. This program also lets you load a digitized sound file and play it on a specific frame of the animation during playback. Movie 2.0 plays both standard ANIM files and the Sculpt-Animate Movie format. While not quite as fast a player as View 3.0, Superview 3.1 is an excellent general-purpose animation player and picture displayer that can also be used as a slide-show program. Like View 3.0, Superview 3.1 supports the added capability of the newest version of the ANIM format to change palettes from frame to frame.

ANIM-Build
Mike Hartman

MakeAnim
Keith Doyle

If you want to create an animation from existing frames, or if you want to create animations in resolutions not supported by DeluxePaint, you have two options. ANIM-Build gives you a file requester from which you can click on picture files in any order. These are added to a list and then compiled into an ANIM file. The latest version of MakeAnim is a CLI-only program, but it works particularly well on DCTV (Digital Creations) images and also lets you create animations that contain changing color palettes.

TruncAnim
Craig Decker

One of the problems you may encounter with animations created in DeluxePaint is that two extra frames are added to the end of the animation to allow for smooth looping. In programs such as AmigaVision (Commodore), in which you want to play the animation once and then hold it on the last frame, you will find that DeluxePaint actually holds on the second frame of the animation. You can get around this problem by subtracting 2 from the number of frames in the Save Anim requester. This can be a tedious task, however, if your animations are already created and saved. TruncAnim strips off those two extra frames (or the number of frames you desire) in an instant.

GrabAnim

The current version of DCTV does not have animation capabilities. GrabAnim lets you press a joystick's firebutton, grab the front screen, and add it as the next frame in an animation. With DCTV, you can create the first frame of your animation, add it to the ANIM file, and then create the next frame. This should help speed up the DCTV animation process or any animation with another program that does not directly support the ANIM standard.

ADAM
Daniel J. McCoy

Speaking of DCTV, if you wish to create animations using LightWave 3D (NewTek), Vista Pro (Virtual Reality Laboratories), Imagine (Impulse), or Animation:JourneyMan (Hash Enterprises), then you will want ADAM (Automated DCTV Animation Maker). This program is a CanDo (INOVAtronics) stack that runs in the background and waits for each 24-bit frame of your animation to be created. Once the frame is saved from its source program, ADAM grabs it, converts it into DCTV format, and adds it to an ANIM file. You also have the option of deleting the source file, so that it is possible to render a 24-bit, 400-frame animation and end up with a DCTV animation—even on a 40MB hard drive. Digital Creations plans to add this utility to future releases of DCTV, but it is currently available as shareware.

Note: View 2.0, Movie 2.0, ANIM-Build, TruncAnim, and GrabAnim are available on the AVG Animation Assistant disk. ADAM and MakeAnim are available on the AVG Picture Tools disk. You can contact the Amiga Video-Graphics Guild at 1833 Verdugo Vista Drive, Suite G, Glendale, CA 91208, 818/242-6728. ■





References and Resources

By Steven Blaize

You may want to create an award-winning animation or music video, or a commercially successful training tape or multimedia presentation. While the choices of things you can do might appear infinite, at the same time your resources may seem limited. But don't despair: As the following brief overview attests, there are plenty of people and places you can turn to when looking for Amiga video- and graphics-related training, support, and visibility. The "Resource List" at the end of this article gives addresses for all sources mentioned.

SCHOOLS

THE GROWTH OF the Amiga market, and computer graphics in general, has encouraged high schools, colleges, and design schools to incorporate Amigas into their curriculums. The levels of integration, however, vary dramatically from school to school. *California Institute of the Arts* has one of the most extensive programs available: It takes students from an introduction to graphics on the Amiga all the way to high-end design with Alias and Wavefront on the Silicon Graphics workstations.

Also in California, the *Brooks Institute of Photography*, which specializes in photography and film, has included Amigas in its video edit bays. *CSU Summer Arts* at California State University at Humboldt heavily incorporates Amigas into what has been referred to as the "largest interdisciplinary arts program in the western US."

Harper College, in suburban Chicago, has 20 Amigas that students use for all sorts of design tasks: computer graphics, stage set design, and interior and landscape design. The University of Wisconsin at Milwaukee has established the *Art Education Electronic Instruction Media Laboratory*, which provides both undergraduate and graduate students with instruction on how to employ personal computers when teaching art to preschool- through college/university-level students.

Canadore College in Ontario, Canada, offers a course on Amiga desktop video that is a part of its annual Artsperience Summer School. Finally, *Savannah College of Art and Design* in Savannah, Georgia, provides courses in computer design, graphics, and animation.

These are just a few of the many. In addition, Amigas are widely used in community colleges—there is a good chance that one in your area offers instruction in computer graphics, animation, or video on the Amiga. Check with schools near you to find out more about what they offer.

You can also receive computer education on a less structured basis. In fact, a large number of consultants provide training, yet have no formal platform other than word of mouth. For leads, check with the Amiga dealer in your vicinity, or with a users' group or BBSs.

USERS' GROUPS, BBSs, SIGs, & NEWSLETTERS

MORE AND MORE users' groups and BBSs—and their special-interest groups (SIGs) and newsletters—are able to give information on and instruction in specific areas of the Amiga. For example, the *Amiga Video-Graphics Guild* is a support group that specializes in video and graphics and publishes a quarterly magazine. The international *Turbo SIG* and *3-D World SIG* both focus on 3-D graphics design and animations. The former holds monthly meetings in Los Angeles, California, and the latter in Livonia, Michigan; each also publishes a monthly ►

newsletter. There are also local chapters of *ACM SIGGRAPH* throughout the country to help you with all kinds of computer-graphics matters.

If you are interested in NewTek's Video Toaster, you can look to the *Toaster Users' Group of Southeastern Michigan*, and *The Upper Crust* and the *Toaster Crustaceans*, both based in California, for support and newsletters. You should also be able to find computer or Amiga clubs in your area having SIGs that concentrate on video or animation.

If you are on line, check out the multitude of BBSs. The larger ones, such as *GEnie* and *CompuServe*, hold both general and specific graphics and animation Amiga forums. Smaller BBSs, such as *Studio Amiga* and Ray's Tracing Place at *Programs Plus and Video*, focus on 3-D graphics and animation.

CONTESTS & FESTIVALS

AFTER YOU HAVE finished your "ultimate" project—be it a still graphic, an animation, video, or multimedia display—you may want to share it. You may also want to get a look at what other computer artists are creating. The best place to turn is to contests and festivals. Some of these, such as *AmiEXPO's Art and Video Contest* and ***AmigaWorld***'s *Animation Video Contest*, are specifically for Amiga-based art and videos. Larger productions, however, such as those sponsored by *ACM SIGGRAPH*, *NCGA* (National Computer Graphics Association), and *Bit.Movie* (located in Italy), include high-end workstation animations, as well as an increasing number of Amiga-based animations.

Festivals include the *Chicago International Film Festival*, the *Telluride International Film Festival*, the *New York Exposition of Short Film and Video*, and the *International Animation Celebration*. Many regional film festivals also have categories for video and animation shorts. In addition, contests or display forums are often sponsored by magazines and product manufacturers. These are all viable ways of seeing new work and having your new work seen. An added bonus to many of these contests is that they award excellent prizes.

This article hardly touches the surface of the wealth of Amiga-related contacts that are available to you. Whether you are new and need help, or have the desire to make your living using the Amiga, you will find individuals, associations, and companies that can assist you in your quest. And as you develop your special knowledge or talent, extend it to others—all of us can learn and grow through sharing information.

Steven Blaize is owner of Creative Fire, a multimedia presentation company, and co-owner of the graphics-development company, Texture City. He is a consultant on Amiga and PC-DOS platforms, and is also assistant director of the Amiga Video-Graphics Guild. Contact him c/o AmigaWorld *Editorial, 80 Elm St., Peterborough, NH 03458.*

RESOURCE LIST

THE FOLLOWING LIST of contacts is intended to be a starting place, not a comprehensive catalog. Please keep us informed, however, about anyone or anything that could be of further assistance to readers in this arena.

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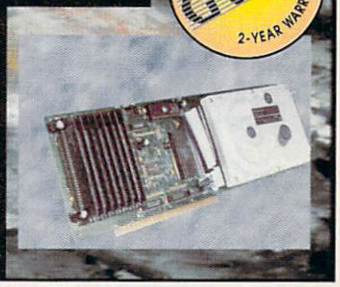


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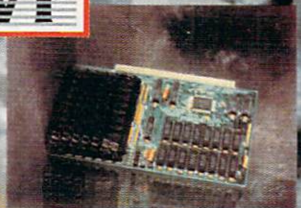
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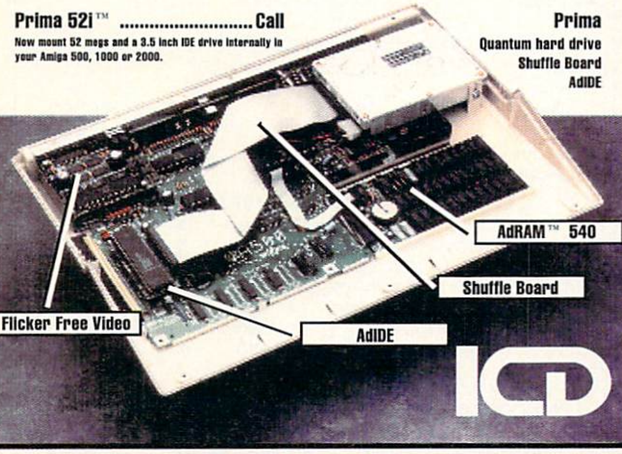
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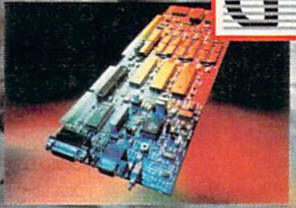
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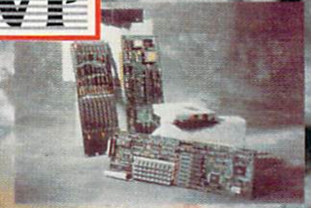
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Defying Gravity...

And Other Laws of Graphics!

If you are reading this issue, you have already seen **Tim Wilson**'s work—one of his finest creations graces our cover. Also, one of the several techniques he used in creating the cover image—reflection mapping—is outlined in his article for this issue (see "Reflection-Mapping Magic," p. 69).

At *AmigaWorld*, we were originally drawn to Wilson's work not only because of its artistry and super high resolution, but because of Wilson's uncanny ability to rival the work done on systems costing many times the price of an Amiga.

Like other renowned Amiga artists, Wilson had an established background in animation and film graphics prior to his work with Amigas. In fact, he was already a professional in the graphics field the day he stumbled upon an Amiga running Impulse's Turbo Silver software in a shop next door to where he was doing his banking. "I saw the 3-D graphics and went for it," Wilson explains. That was slightly less than two years ago.

Wilson had originally looked into working with 3-D on an IBM PC. Fortunately, the Amiga was not only inexpensive, but it also had software powerful enough to more than compete with the other graphics systems used in the industry. So Wilson bought an accelerated A2000 and got to work.



Tim Wilson (front, right) backed up by Anti Gravity Workshop colleagues Dan Lutz (left) and Thomas Hollier (back, right).

His goal from the start was to work on motion picture film. He got together in Santa Monica, California, with two other computerists, **Thomas Hollier** and **Dan Lutz**, who had similiar desires. They started a business to, as Wilson explains, "tap the resources of the Amiga to get higher output." Calling their business the **Anti Gravity Workshop** (AGW), the three began to assemble the best in the way of peripherals. A key purchase was a Polaroid CI-5000 Film Recorder (around $6000) that produces 4000×3000 imaging resolution.

The threesome at Anti Gravity were not at a loss for assistance. In fact, Amiga developers such as ASDG and Impulse provided help via product discounts, free programs, moral support, and the addition of new features to their products. "People seem to anticipate what we want to do. For instance, ASDG developed drivers for the film recorder, and Epson [developed] scanners," Wilson says.

To get the most out of the Amiga, Lutz built what the group calls an Amiga 3000 Cube. It has a bigger case, a 435-watt power supply, a 1.2-gigabyte hard drive, and DAT backup. Anti Gravity also plans to network its array of A3000s to render, batch process, and record images.

Anti Gravity has chosen to focus much of its attention on film, Wilson explains, "because it is such a flexible medium. It may seem strange, but film is excellent for doing high-end video animation, because once the frames are recorded, the film can be transferred to virtually any video format—one-inch, digital videotape, and so on. Film's superior resolution makes it a great choice for high-end broadcast work."

AGW does, of course, also have an impressive array of video equipment: a NewTek Video Toaster, an Impulse Firecracker 24, a Nucleus Personal Single-Frame Recorder, and a Panasonic AG-7750 video deck, as well as access to laser-disc recorders.

In conclusion, Wilson adds, "Working on this platform is a daily challenge and a labor of love. What makes the Amiga so good is the diverse range of new and affordable products for these applications. I believe the Amiga is *the* machine for entrepreneurs who have a passion for their vocation but don't want to go through the usual channels."

—Doug Barney and Dan Sullivan

For our Special Issue, Tim Wilson and the Anti Gravity Workshop produced the cover image on an A3000/25 MHz with 18MB of RAM. The figure was derived from Wilson's "Cycle-Man" package and modeled and rendered in Impulse's Imagine. The real-world images were scanned from photos with the Epson ES-300C flatbed scanner. Compositing and processing were done with ASDG's AD Pro, and final touch-up was performed with Impulse's Firecracker 24 and Light24 paint program.

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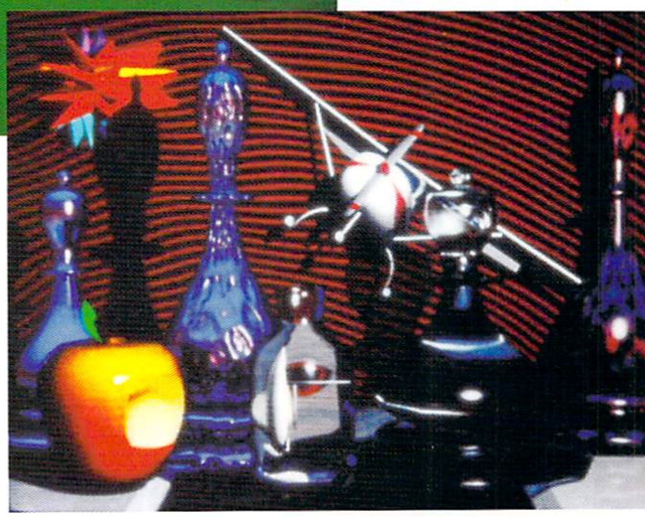
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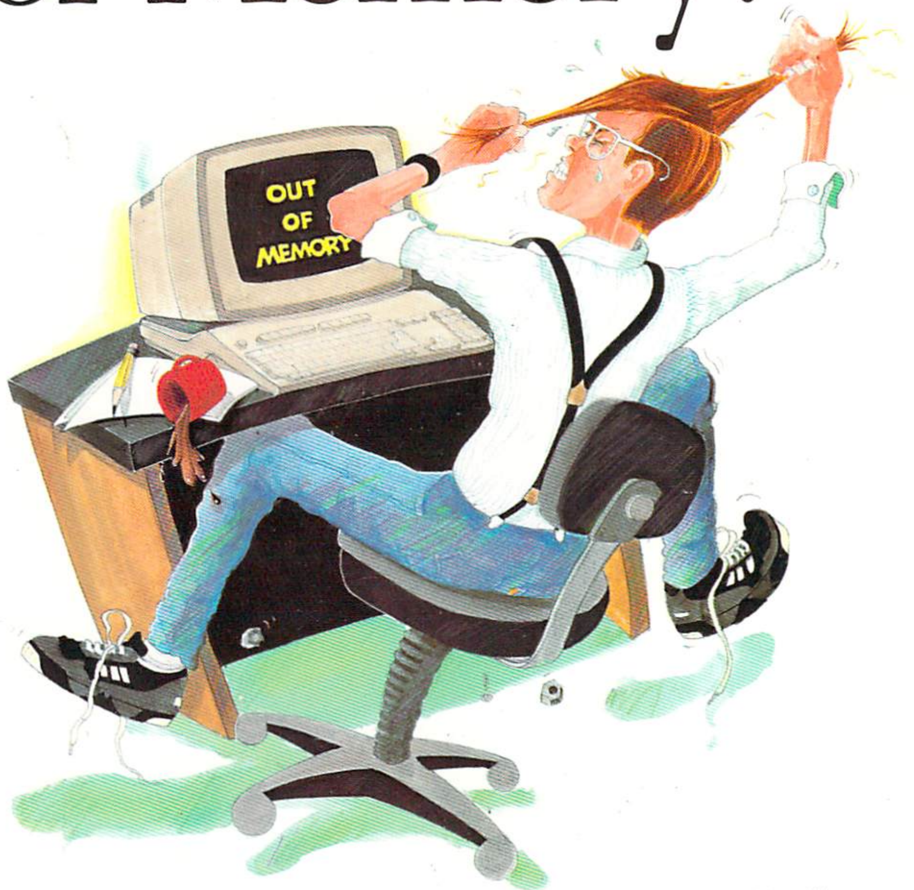
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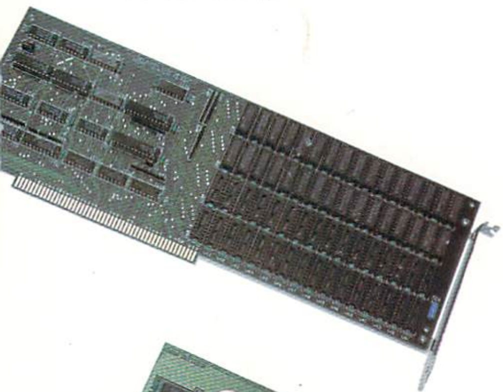
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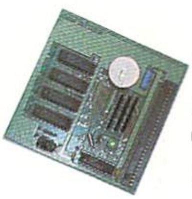
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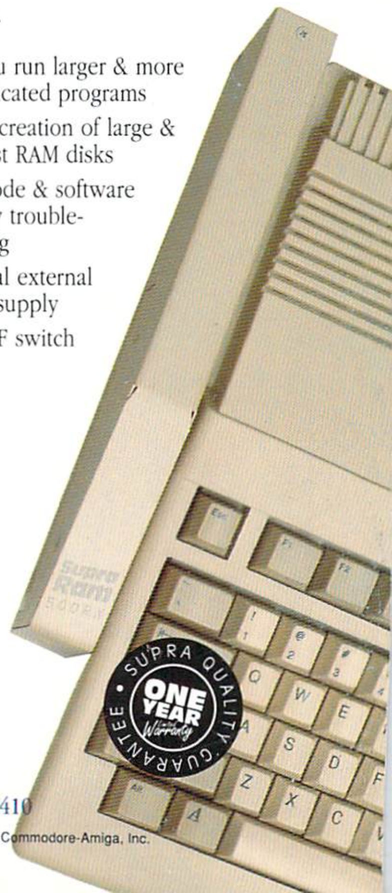
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